THE JOURNAL of the LOUISIANA STATE MEDICAL SOCIETY

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## Contents

Acute Renal Failure, by Arthur J. Merrill, M. D., Atlanta, Georgia ..... 365

An Evaluation of Radioactive Iodine (131) Therapeusis in Thyrotoxicosis, by S. B. Nadler, M. D., T. Bloch, M. D., J. Hidalgo, M. Sc., and R. Nieset, Ph.D., New Orleans ..... 368

The Relationship Between the State Mental Hospital and the General Practitioner, by William L. Kirkpatrick, M. D., Jackson ..... 375

Surgical Aspects of Meckel's Diverticulum, by Powhatan W. James, Jr., M. D., Houston, Texas ..... 380

Insulin Preparations in the Treatment of Diabetes Mellitus, by Daniel W. Hayes, M. D., New Orleans ..... 387

Gallstone Obstruction of the Small Bowel, by Samuel Karlin, M. D., and W. Charles Miller, M. D., New Orleans ..... 391

Teaching Modern Rhinology, by Ralph H. Riggs, M. D., Shreveport ..... 396

Editorial ..... 398

Organization Section ..... 400

Medical News Section ..... 403

Book Reviews ..... 404

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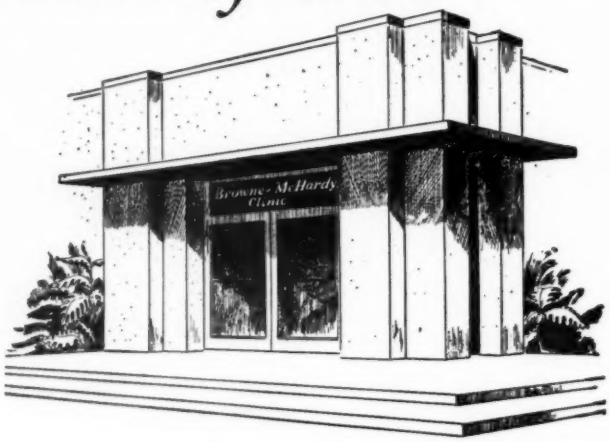


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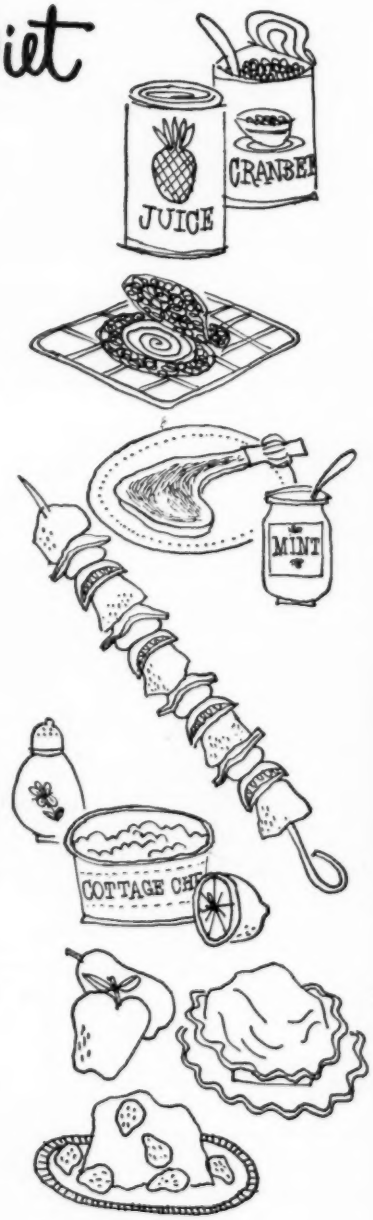


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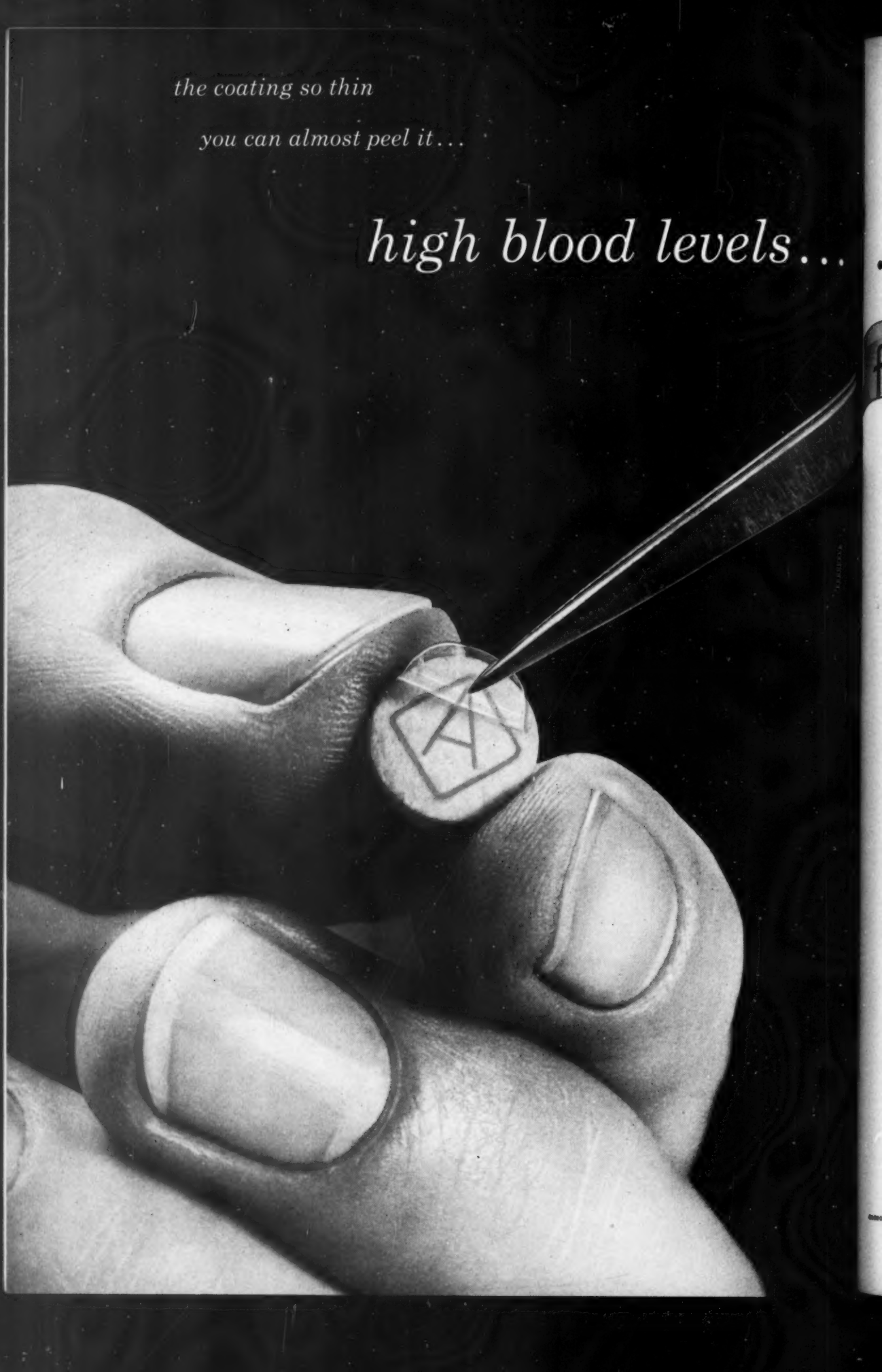

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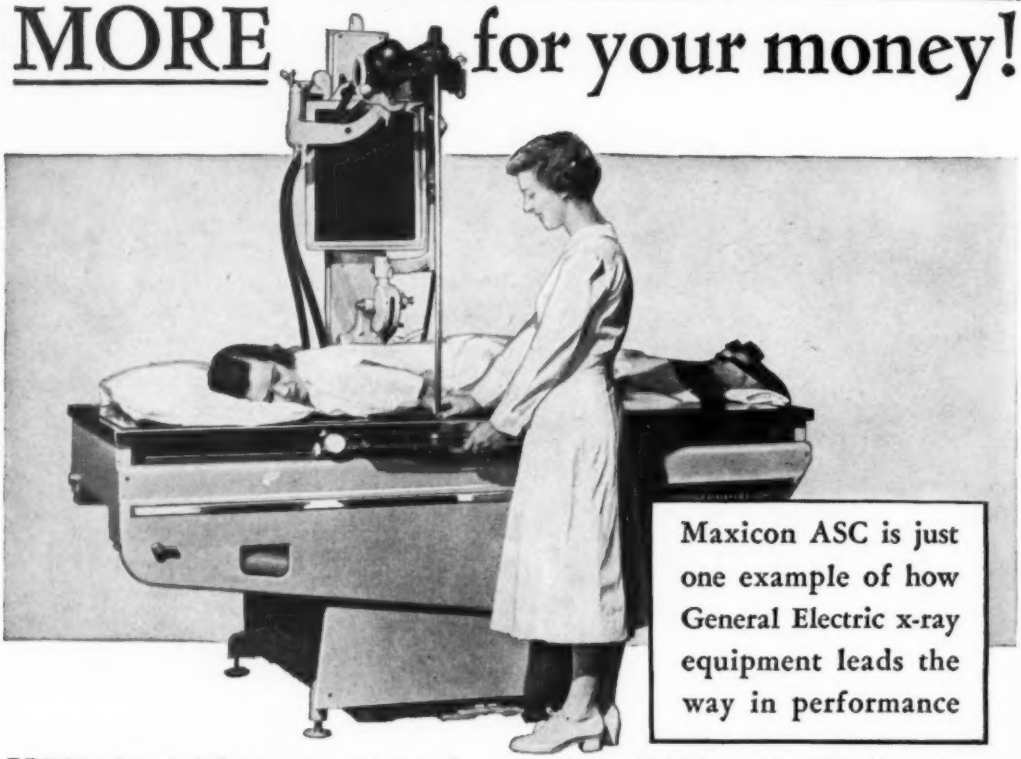

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OCTOBER, 1954

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## ACUTE RENAL FAILURE *


ARTHUR J. MERRILL, M. D. †

ATLANTA, GEORGIA


Lower nephron nephrosis is essentially a disease of the renal tubules accompanied by oliguria or anuria. The etiological factors are shock; pigment excretion as in crushing injuries, transfusion reactions from incompatible blood, intravenous distilled water administration, burns and blackwater fever; sulfonamide intoxication, hyperthermia, mushroom poisoning, carbon tetrachloride poisoning, severe infections and intoxications of all kinds, allergy and anaphylaxis, gastroenteritis, electrolyte disturbances, and hepatorenal syndrome.

The pathology consists of marked disorganization within the tubular cells, first in the ascending limb of the loop of Henle and next in the distal convoluted tubules. Damage is also extensive in the proximal convoluted tubules. The lesions are patchy with perfectly normal tubule cells lying side by side with completely necrotized segments of tubule. Reabsorption of the globin molecule from myoglobin in crushing injuries and the globin molecule of hemoglobin and pigment disturbances is supposed to produce the damage within the tubular cell. The pigment also obstructs the tubular lumens with casts producing further disturbance or function. Actually the pathogenesis is not as simple as this, for when animals receive intravenous injections of hemoglobin or myoglobin no lesions are produced in the kidney. The animal must be dehydrated and thrown into shock before the classical picture can be produced, and even then it is sometimes difficult. One is surprised at times to see that a human being may receive 500 cc. of completely incompatible blood without even developing oliguria. One patient the author saw received 4500 cc. of distilled water intravenously over a three-day period and had only brief oliguria. Decrease in glomerular filtration rate by chill, shock, dehydration, or in a reduction in blood volume enhances the likelihood of renal damage.

### CLINICAL PICTURE

Early recognition is of great importance in preventing mismanagement. Urine output should be recorded carefully during the twenty-four to forty-eight hours after surgery or transfusion and someone should look at the color and character of the urine when it is first passed after one of these procedures or after a patient has been through a period of shock.

In heavy metal intoxication there may be actual diuresis for the first twenty-four to forty-eight hours after which oliguria sets in. Complete anuria is unusual and the patient usually passes 50 to 200 cc. of urine each twenty-four hours. In exceptional cases a normal urine flow of 2000 to 2500 cc. may continue, and the only clue to the diagnosis may be a rising blood NPN. Proteinuria is found constantly, and the urine usually has a dark appearance from hemoglobinuria or myoglobinuria in transfusion reactions, shock,

---

* Presented at the Seventy-fourth Annual Meeting of the Louisiana State Medical Society, May 22, 1954, in New Orleans.

† From Department of Medicine, Emory University and Renal and Electrolyte Laboratory, Grady Hospital, Atlanta Georgia.

and crushing injuries particularly. Nausea and vomiting begin early and become a problem in most patients who continue to take food or water. Sensorium is amazingly good in many well-treated patients throughout the course of the illness, despite marked chemical disturbances. However, crushed and infected patients often develop disorientation initially which is persistent. A rise in blood potassium or overzealous administration of fluids and salts can precipitate mental confusion. Edema is not a sign of the disease but it is a sign that fluid has been given in excess of the amount which the patient can eliminate. Hypertension is unusual if the patient is not overtreated. Convulsions usually result from potassium intoxication or cerebral edema, and are seldom due to hypocalcemia since the low blood calcium is counterbalanced by the low $CO_2$ combining power which produces an increase in the ionized calcium.

Cardiac dilatation, gallop, and pulmonary edema come from overhydration or transfusions. Fever is absent after the first few days unless there are complications.

A normochromic normocytic anemia appears early as a result of hemodilution, hemolysis, bone marrow depression, and other unknown causes. Leukocytosis of 20,000 or more may persist even into the postanuric phase. For the first day or two a specific gravity of 1.020 or better is maintained but after this the specific gravity of the urine drops to 1.010 and remains low. After the first day or two glycosuria is not seen even though the blood sugar is maintained at a high level with 25 per cent or 50 per cent glucose.

The blood sodium falls rapidly in all patients except in those with extremely careful fluid adjustment, in which it may remain normal. The blood bicarbonate, or $CO_2$ combining power, drops early in all patients except those who lose large quanities of chloride by vomiting, especially in pregnant patients who have a high gastric acidity. Occasionally, such a patient may have a moderate alkalosis.

About one-fourth of the patients have potassium intoxication with a blood potassium above 8 mEq/L. and three-fourths have some rise in potassium. The blood phosphorus is high and the calcium is low.

On about the third day, degeneration of the tubules begins and is usually complete about the tenth day. If an indwelling catheter is maintained the patient is found to excrete gradually increasing quantities of urine until urine flow reaches 700 to 1000 cc. after which it increases much more rapidly, and finally a real diuresis of 3000 to 4000 cc. of urine daily is established.

The patient is usually much sicker and the chemistries are more abnormal for the first few days after diuresis is established, and he does not feel good for about two weeks. Nausea remains a problem for at least a week after diuresis.

### DIFFERENTIAL DIAGNOSIS

Victims of *mercury poisoning* may have a history of ingestion and may often have a bloody diarrhea with abdominal cramps. *Dehydration* seldom produces oliguria of less than 500 cc. a day unless the dehydration is sufficient to produce a reduction in blood pressure. The skin is inelastic and putty-like and the blood bicarbonate, or $CO_2$ combining power, falls less rapidly. Early hypertension and edema which are *not* seen with lower nephron nephrosis commonly accompany *acute glomerulonephritis* and help to differentiate the two. In later stages of glomerulonephritis the filtering units may be so severely damaged that oliguria is produced. Early hypertension and edema and a previous history of nephritis help in this diagnosis.

*Bilateral cortical necrosis* occurs usually in pregnant women, most frequently with premature separation of the placenta, but can be diagnosed in life only with a needle biopsy.

In *toxemia* of *pregnancy*, hypertension appears early and there is a rapid increase in the blood uric acid out of proportion to the increase in NPN.

*Low salt syndrome* is rare in stressful situations because the kidneys are usually retaining salt in the latter. However, if

large gastrointestinal losses have occurred it may result. When salt is given in the early postoperative period, oliguria of around 300 to 400 cc. may be produced. This may be differentiated from the lower nephron syndrome by the fact that a higher blood bicarbonate is present, thought to be caused by overactivity of the adrenal cortex.

The *prognosis* in cases uncomplicated by infection or injury is about 80 per cent recovery in properly treated patients. With infection or injury the mortality rate is raised to about 80 per cent. Death is due to pulmonary edema from transfusions or too much fluid, or it may be from potassium intoxication. Sudden death may occur any time after the sixth or seventh day even in the absence of potassium intoxication from unknown causes.

In about a third of the patients renal function never becomes any better than about 70 per cent of normal, which of course is perfectly adequate. It usually reaches its best level within three months after the illness.

### TREATMENT

The aims of treatment are (1) to prevent protein catabolism since the end products of protein catabolism are toxic, (2) to keep the body water normal, and (3) not to give anything harmful. If the patient can retain food or fluid, a Borst diet, which is a butter and sugar mixture of about 2400 calories per day, is given by mouth, or a Bull diet which is a coconut or peanut oil and dextrose mixture can be given by Levine tube since it is liquid. If the patient is nauseated, 50 per cent glucose may be given in distilled water through a polyethylene catheter threaded through the femoral vein into the inferior vena cava, or 25 per cent glucose may be given into a peripheral vein, the amount to be determined by the patient's daily fluid requirement. Fluids are limited to 600 cc. plus the volume loss through the kidney or from the gastrointestinal tract. No salt or alkali is given except to replace intestinal losses. The idea that cast formation can be prevented by the early administration of alkalies has been completely discarded. Potassium, acid salts, and diuretics are *harmful* and should never be used. One does not try to correct the abnormal blood chemistry findings other than potassium elevation. Transfusions are avoided unless the hemoglobin falls below 6 grams; then only packed red cells should be given, or else pulmonary edema may be precipitated.

Potassium-absorbing resins have been used effectively by some by giving them from the very first day, but in our experience the patient is usually too nauseated to take them. They are not nearly so effective when given by rectum. Temporary relief from potassium intoxication may be obtained by the use of 50 per cent glucose and insulin or by calcium gluconate administration. Gastric suction is helpful for a while and peritoneal lavage is even more effective. A ureteral catheter is introduced through a paracentesis needle into one side of the abdomen and about 2000 cc. of the dialyzing fluid introduced. After this a catheter is placed in the opposite side of the abdomen and the fluid drip is adjusted to the output.

Antibiotics are given to the patient and peritonitis will not usually result if the patient is not treated for longer than thirteen hours.

A safer and more effective procedure is dialysis by the artificial kidney. If urine flow is still less than 500 cc. a day and the blood potassium is as high as 7 mEq./L., dialysis should be used. Those with great experience in the field are convinced that some deaths can be prevented by using the kidney routinely after the seventh to tenth day of oliguria with no sign of diuresis. It is not uncommon to have a sudden death in the presence of a normal potassium after the seventh to tenth day.

Salt loss in the diuretic phase or postanuric phase has been overemphasized, and no harm is done by withholding salt a little too long. Much harm can be done by giving salt during the first few days of the postanuric period when at times 3000 to 4000 cc. of water may be passed with relatively little sodium chloride in it.

Salt administration at this time may result in acute pulmonary edema, as may transfusions. Salt administration should be limited to that which is lost in the urine, and transfusions and alkalies should be delayed a week or more if possible.

Too rapid administration of alkali may raise the carbon dioxide combining power before the calcium returns to normal and tetany may be precipitated because of reduction in the amount of ionized calcium.

In patients with bilateral cortical necrosis sodium and chloride excretion may begin early in the diuretic phase and replacement may be necessary at this time. While low blood potassium may occur during the diuretic phase it seldom becomes of any clinical significance and it is seldom necessary to give potassium before diet can be started. Some multivitamin preparations should be given throughout the course of the illness.

—o—

## AN EVALUATION OF RADIOACTIVE IODINE (131) THERAPEUSIS IN THYROTOXICOSIS*

S. B. NADLER, M. D.
T. BLOCH, M. D.
J. HIDALGO, M. Sc.
R. NIESET, Ph. D.
NEW ORLEANS

In the past four years we have adopted standards for the measurement of radioactivity in the human thyroid gland [1] and have used this technique for the measurement of radioactivity in the gland after a given tracer dose of iodine $^{131}$ to indicate the differential uptake in various states of thyroid function [2]. These studies have since been extended to the treatment of the hyperactive thyroid gland, carcinoma of the thyroid gland, and to the treatment of various types of heart disease. It is the purpose of this report to analyze our results in the treatment of thyrotoxicosis in private and clinic cases at Touro Infirmary.

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From the Departments of Biophysics and Medicine, Touro Infirmary and Tulane University, New Orleans, La.

The most difficult problem is that of therapeutic dose level. The objective is to achieve a state of euthyroidism with a single administered dose if possible. A great deal of uncertainty as to therapeutic dose is evidenced in the literature—some workers use multiple small doses, others large doses. The factors which influence the effect of a given dose are many, including varied susceptibility of the thyroid tissue to irradiation, lack of complete correlation between tracer dose retention and treatment dose retention in the gland [5], the effective half life of radioactivity in the gland, the rate of thyroidal turnover of radioactive material and the anatomic state of the gland (diffuse versus nodular) [3]. Seed and Jaffe [5] state rather succinctly that "it is wise to give the minimum effective dose in a young patient without much thyroid enlargement, add a few millicuries in an elderly patient, add a few more if the symptoms are severe, double the dose if the heart is badly damaged, subtract a millicurie or two if the patient is already overweight and add a couple if the patient lives out of town or if the patient's doctor is dubious of the value of treatment. In nodular toxic goitre, one may as well start with 20 millicuries and add 10 more if the gland is large." We chose to follow the suggestion of McCullagh and Richards [3] which embodied the administration of 4 millicuries for a normal size gland and increase of the dose by 1 millicurie for each additional estimated 10 grams of gland. This meant the administration of 6 to 8 millicuries in glands one and one half to twice normal size. Cases of recurrent hyperthyroidism presented a peculiar problem. When thyroid tissue was palpable, approximately 4 millicuries were given. When there was no palpable thyroid tissue, 2 to 10 millicuries were given depending on the urgency of the situation.

The treatment does not require routine hospitalization, but we prefer hospitalization for two or three days until most of the radioactive urine excretion has taken place. In general, the beneficial effects of irradiation in reducing toxicity are not ap-

parent until some six to eight weeks have passed. During this time many patients are placed on sedation and antithyroid drugs. Marked reduction in gland size is uniformly noted except in large nodular goitre associated with fibrosis and calcification. For the first and subsequent tracer studies all antithyroid medication is discontinued five or more days prior to study. Unless this is done, blockage of iodine uptake occurs. In the case of stable iodine, the gland may be blocked for three or more months except in very toxic cases. Pretreatment uptakes are done on all treated patients. Post-treatment uptakes are done routinely two months after the first and subsequent treatment doses.

A total of 97 cases of hyperthyroidism were treated; of these, 11 cases were immediately rejected as unsuitable for thorough statistical analysis. The reasons for rejection of these 11 cases include questionable toxicity, poor follow-up, inadequate time elapsed since treatment, and private cases reported elsewhere. Accordingly, 86 cases were reviewed statistically. Fifty-five cases were personally handled; an evaluation of the remaining cases referred back to their doctors was obtained by discussing the patients with the referring physician. The evaluation, in toto, represents the opinions of many doctors. These toxic cases were classified as follows: diffuse toxic (67 cases), diffuse toxic—postsurgical (11 cases), nodular toxic (6 cases) and nodular toxic—postsurgical (2 cases).

Table 1 summarizes our results. Hyperthyroidism was overcome in 74 cases (86 per cent). Of these, 61 cases became euthyroid directly and 3 cases exhibited temporary hypothyroidism reverting to euthyroidism without therapy. A direct euthyroid state was obtained in 64 cases (74 per cent). Eleven cases required maintenance therapy on desiccated thyroid to obtain a euthyroid state (13 per cent). Twelve cases (14 per cent) failed to achieve a euthyroid state. These cases include an early death from arteriosclerotic and hypertensive heart disease, 1 death in thyroid storm twenty-four hours after treatment, 6 cases with insufficient time elapsed since treatment to completely evaluate them, 3 cases still toxic refusing further treatment and 1 case of hypothyroidism refusing desiccated thyroid therapy. At this point, failure in treatment is something which may occur because the therapist's hands are tied. The method itself does not admit to the possibility of failure to overcome hyperthyroidism.

TABLE 1

| | |
|---|---|
| RETURNED TO EUTHYROID STATE | 74 CASES (86%) |
| Primary euthyroid | 61 |
| Temporary hypothyroid * | 3 |
| Permanent hypothyroid † | 10 |
| NOT RETURNED TO EUTHYROID STATE | 12 CASES (14%) |
| Interim death | 2 |
| Too early to evaluate | 6 |
| Still toxic | 3 |
| Permanent hypothyroid | 1 |

* Spontaneously became euthyroid
† Required dessicated thyroid therapy

An evaluation of the 74 cases that became euthyroid is indicated (Table 2).

TABLE 2

GENERAL DATA
74 EUTHYROID CASES

| | | % | No. |
|---|---|---|---|
| Sex | Female | 80 | 59 |
| | Male | 20 | 15 |
| Age (Years) | 0 — 20 | 3 | 2 |
| | 20 — 40 | 34 | 25 |
| | 40 + | 63 | 47 |
| Diffuse gland | | 91 | 67 |
| Nodular gland | | 9 | 7 |
| Exophthalmos | | 36 | 27 |
| Post-surgical | | 16 | 12 |

Figure 1 shows the distribution of pretreatment iodine $^{131}$ uptake of a tracer dose in these cases. It indicates that there is a bell-shaped distribution of uptake in the toxic range with 93 per cent of the cases showing an uptake greater than 45 per cent. Whereas it might be expected that even in the toxic level greater toxicity would be reflected in increased uptake, this was not always the case in view of the fact that greatest clinical toxicity did not necessarily indicate greatest iodine uptake.

Figure 2 indicates the number of treatments required to return the patients to

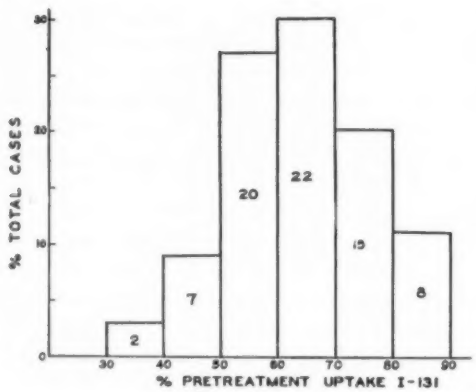

Figure 1

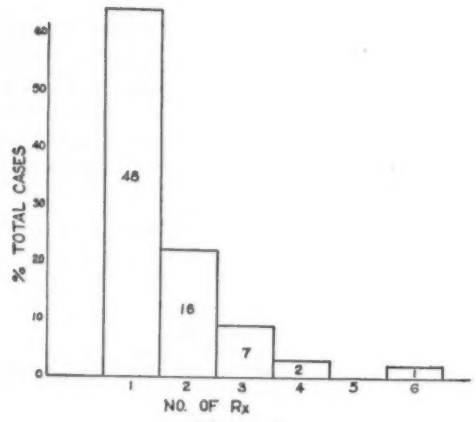

Figure 2

the euthyroid state. Sixty-four per cent (48 cases) required one treatment; 22 per cent (16 cases) required two treatments and 14 per cent (10 cases) required three or more treatments to return to the euthyroid state. It is our clinical impression that patients showing greater clinical toxicity require more treatment and seem to require a longer period of treatment to reach the euthyroid state.

Figure 3 shows the distribution of the total therapeutic dose; the range was 2 to 22 millicuries with an average of 9 millicuries; 75 per cent of the cases required 10 or less millicuries. The duration of treatment (Figure 4) ranged from two to twenty-six months; 65 per cent (49 cases) became euthyroid in two months, 11 per cent required four months, 7 per cent required six months, 8 per cent required eight months, 7 per cent required ten months, 2 per cent required twenty-six months. Thus, 77 per cent of the cases achieved the euthyroid state within four months after treatment was started. The duration of the follow-up ranged from two to forty-four months, the cases being somewhat evenly distributed during this period. The average follow-up period was seventeen months.

Elsewhere[2] we classified uptakes of radioactive iodine in four groups: low (0 to 10 per cent), normal (11 to 39 per cent), borderline (40 to 44 per cent, in which two thirds of the cases prove toxic), and high (45 plus per cent, in which almost all of the cases prove toxic). Post-treatment studies were obtained on 53 post-treatment euthyroid cases. In this

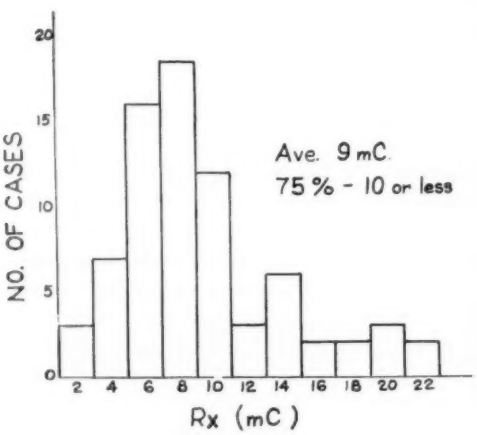

Figure 3

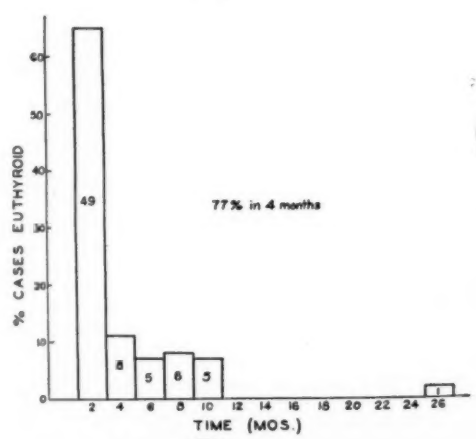

Figure 4

group (Table 3) we found low uptakes in 10 cases. Clinical euthyroidism is com-

TABLE 3

| POST TREATMENT UPTAKE | | % | No. |
|---|---|---|---|
| EUTHYROID — 53 CASES | | | |
| Low uptake | 0 — 10% | 19 | 10 |
| Normal uptake | 11 — 39% | 62 | 33 |
| High uptake | 45 + % | 17 | 9 |
| Normal — Then high uptake | | 2 | 1 |
| HYPOTHYROID — 8 CASES | | | |
| Low uptake | 0 — 10% | 100 | 8 |

patible with a low uptake. While more than half the cases showed normal uptakes, a considerable number (17 per cent) had persistent toxic level uptakes in the absence of hyperthyroid symptoms. In one instance a previously normal uptake reached a toxic level while the patient was still euthyroid. It may be surmised that future, longer observations may reveal a rebound in all of these groups to somewhat higher uptake levels; conversely, drops in uptake level may occur [14] as we have observed in one instance.

Following treatment, two cases developed exophthalmos which was readily controlled with desiccated thyroid. Four cases have become pregnant which can hardly be attributed to the therapy. Complete statistics are not available on gland size after treatment. In the 55 cases adequately followed, the gland size was reduced to normal in all but one—a large, calcified, nodular goitre. There was no pre-treatment medication in 71 per cent of the cases, 23 per cent had had antithyroid drugs and 6 per cent had taken iodides; 12 cases had previous surgery.

Table 4 indicates the breakdown of our data according to clinical classification of the glands. Reference is made to this table in the discussion.

An evaluation of the 11 cases (13 per cent) that became hypothyroid is indicated in Table 5. Hypothyroidism oc-

TABLE 5

| HYPOTHYROID CASES (11) — 13% | | |
|---|---|---|
| Diffuse glands | Non-surgical | 10 |
| | Post-surgical | 1 |
| Average No. Rx | | 1 |
| Average follow-up | | 22 MOS. |
| Average Rx dose | | 6.6 MCS. |
| Average Pre-Rx uptake | | 65% |
| Average Post-Rx uptake | | < 10% |

curred only in cases of diffuse toxic glands, one of which had previous surgery. The initial size of the gland was normal in 4 cases, twice normal in 6 cases and in 1 it was not palpable due to prior surgery. The dose given averaged 6.6 millicuries. The surprising fact that appeared was that all of the cases of hypothyroidism received only *one* treatment dose. The average pre-treatment uptake was 65 per cent. The post-treatment uptake was less than 10 per cent in all cases.

An important consideration is the role that antecedent treatment with antithyroid drugs may play in altering radioactive iodine uptake. There seems to be some evidence that the treatment of euthyroid patients with antithyroid drugs followed by withdrawal of the drug for five or more days may lead to abnormally elevated radioactive iodine uptakes. Our data cannot answer this question with reference to euthyroid patients, but they do indicate that previous use of antithyroid drugs does not alter the up-

TABLE 4

| | | DIFFUSE TOXIC SIZE | | DIFFUSE TOXIC POST-SURG. | NODULAR TOXIC | NODULAR TOXIC POST-SURG. |
|---|---|---|---|---|---|---|
| Palpable | | 0 | 2+ | | | |
| Cases | | 26 | 41 | 11 | 6 | 2 |
| Ave. Pre-Rx uptake | | 63 | 63 | 57 | 73 | 50 |
| One treatment | % | 66 | 66 | 87 | 66 | 0 |
| Ave. Rx dose | MC. | 6.8 | 9.8 | 6 | 12 | 16 |
| Hypothyroid | % | 17 | 18 | 9 | 0 | 0 |
| Euthyroid | % | 69 | 71 | 91 | 84 | 100 |
| Discarded | No. | 4 | 6 | 0 | 1 | 0 |

take in toxic patients (Figure 5). Fifty-eight cases did not receive pre-uptake

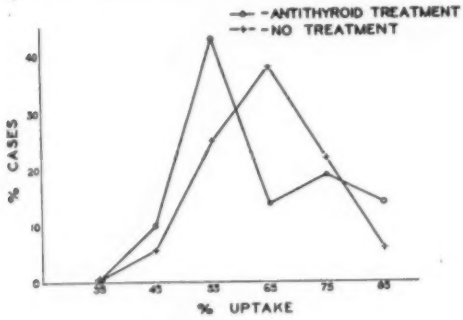


Figure 5

antithyroid drugs; 21 cases received such drugs. All cases taking iodine were excluded from the study. The mean uptake for the 58 cases not receiving antithyroid drugs was 63.9 per cent with a standard deviation of 10.1. The mean uptake for the 21 cases on antithyroid drugs was 63.6 per cent with a standard deviation of 12.5. Unfortunately, all but one of the nodular glands was in the group that did not receive antithyroid drug.

An attempt was made to correlate pre-treatment uptake with the dose necessary to induce the euthyroid state. The data plotted in the scattergram (Figure 6) in-

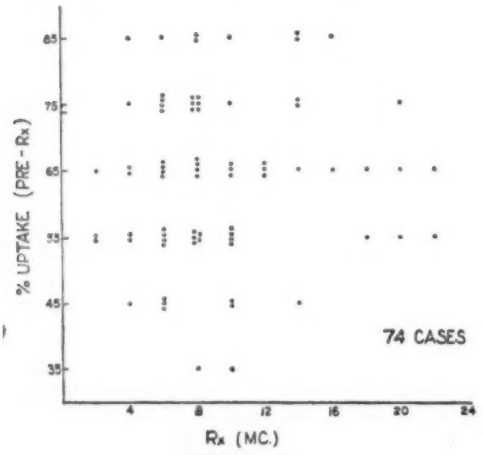


Figure 6

dicate the lack of straight line relationship.

Contrary to most of the reports in the literature, we could not elicit complaints of a local or general nature in patients given doses for the treatment of hyperthyroidism. Soley, Miller and Foreman [4] reported fairly frequent tenderness in the thyroid region within twenty-four to seventy-two hours after iodine $^{131}$ had been given, especially when 2 millicuries or more were given in a single dose. Complaints of a "lump in the throat, a sense of constriction in the neck or mild difficulty in swallowing" may be heard from four to six weeks after treatment [5]. In our experience, we rarely encountered such signs or symptoms but this may only mean that they were not looked for with sufficient care. We are well acquainted with these very signs and symptoms in patients receiving large doses, 20 or more millicuries, in the treatment of heart disease or cancer of the thyroid.

## DISCUSSION

An attempt made to analyze the four clinical groups of thyroid cases enumerated above from the standpoint of pre-treatment uptake, average number of treatments, etc., was not valid because of the small size of the toxic nodular group. From the data available on the diffuse toxic group it would appear that the size of the gland has no bearing on pretreatment or post-treatment uptake or on the incidence of post-treatment hypothyroidism. As expected, increased gland size necessitated increased treatment dose to attain the same result. As pointed out above, the division of our cases into diffuse and nodular glands does not permit us to evaluate the differences between these groups. A general survey of the literature [5] indicates that satisfactory remission occurs in 80 per cent of both types of glands as compared to 86 per cent remission in our series.

The incidence of hypothyroidism subsequent to treatment of diffuse glands varies widely, ranging from 9 per cent to 19 per cent [5] and even as high as 25 per cent. [6] McCullagh and Richards [3] treated 78 cases of toxic nodular goitre without producing hypothyroidism while Scott et al [6] found an incidence of only 3 per cent in the treatment of toxic nodular goitre. These data indicate that the

actual incidence of hypothyroidism in any mixed series may depend upon the relative proportion of diffuse and nodular glands treated. Our incidence of hypothyroidism was 13 per cent in a series having a ratio of diffuse to nodular of 10 to 1. The over-all incidence in the literature for both types of glands is about 9 per cent. It should be emphasized that all of our cases that became hypothyroid were diffuse glands. We noted that there appears to be little opportunity for decreasing this incidence by present methods. All cases of hypothyroidism in our series received but *one* treatment. The average treatment dose for these cases was 6.6 millicuries while the average treatment dose to produce euthyroidism in the diffuse gland series as a whole was 8.8 millicuries. We therefore, cannot assign hypothyroidism encountered to the use of unduly large doses.

In a review of 942 thyrotoxic cases treated with antithyroid drugs followed by thyroidectomy, Bartels [7] reported an incidence of 7.3 per cent postoperative myxedema with 5.2 per cent permanent myxedema. These figures are essentially the same as those obtained when the preoperative preparation was iodides. The series contained the ratio of diffuse to nodular glands of approximately 4 to 1. The clinical toxicity, duration of disease, amount of goitre tissue removed and duration of antithyroid therapy had no relationship to the development of myxedema. It occurred about five times more frequently in diffuse hyperthyroid cases as in adenomatous goitre with hyperthyroidism. Excessive lymphocytic infiltration and fibrosis (strumitis) was six times more frequent in glands of patients who developed myxedema. In the surgery of Grave's disease conservative procedures yield about 5 per cent hypothyroidism whereas radical surgery yields about 20 per cent; the corresponding figures for the two types of surgery in nodular goitre are about 2 and 4 per cent. While it is possible that repeated small doses with radioactive iodine may decrease the incidence of hypothyroidism, some cases preclude such a method because of the urgency in obtaining relief by treatment. The two month intervals between multiple treatment with coincidental time loss, expense, etc., may mitigate against such a procedure.

The aim of treatment is to achieve a euthyroid state with one treatment; our data show 88 per cent euthyroidism with two treatments. The average dose to produce euthyroidism was 9 millicuries for both types of glands and 8.6 millicuries for diffuse glands. Nodular glands require about twice this dose. It is apparent from Table 3 that there may be lack of correlation between the clinical status of the patient and the post-treatment uptake of radioactive iodine. Of 53 clinically euthyroid patients only 62 per cent had uptakes in the euthyroid range.

The effect of treatment with radioactive iodine on exophthalmos is apparently no different from the effect produced by thyroidectomy. Measurement fails to reveal significant alteration in proptosis [4, 8]; exophthalmos may be aggravated or appear for the first time following treatment as occurred in two of our cases.

It is our impression that radioactive iodine therapy is the procedure of choice at this time in the treatment of primary hyperthyroidism. Several authors [9-12] have raised the question of the possible development of postirradiation malignancy. Thus far, no reports of such an occurrence have appeared in the literature—which is strange indeed. While the incidence of carcinoma is low in primary hyperthyroidism (2 cases in Bartels series of some 700 cases), sooner or later such a case will be treated with iodine $^{131}$ to later blossom out as a full-fledged malignancy. It does not seen unreasonable that some controversy will arise as to whether the malignancy was extant prior to or caused by the irradiation. Quimby and Werner [12] polled seventy radiologists and thirty thyroid specialists with reference to the incidence of post x-ray irradiation malignancy. No significant incidence of malignancy attributable to irradiation was found. They calculated that the hazard

associated with radioactive iodine therapy was no greater than with x-ray. Some hesitancy may be felt about going ahead with treatment which does not allow for examination of the tissue for possible malignancy. It is cogent, therefore, that some reliable figures be available in order to estimate the risk of treating patients with radioactive iodine.

Sokal [13] has recently critically analyzed American statistics on the incidence of malignancy in toxic goitre. He concludes that thyroid cancer arises more frequently in toxic than in nontoxic goitre, albeit the risk is small. The incidence of cancer in toxic nodular goitres is about 1 per cent; the incidence in diffuse goitre is even less. Some series give even lower figures than these. The risk of overlooking malignancy is small enough to warrant the use of radioactive iodine in all toxic cases.

To date there is no clear evidence that routine therapy has any significant effect upon the reproductive organs or their function. Four of our cases have become pregnant since treatment and 2 have already delivered normal children. Only one case of temporary hypoparathyroidism has been reported in the literature [15].

## CONCLUSIONS AND SUMMARY

1. Eighty-six cases of hyperthyroidism treated with radioactive $I^{131}$ are statistically studied and reviewed.

2. A euthyroid or hypothyroid state may be achieved in any case of hyperthyroidism depending on the dose of radioactive iodine used.

3. Pretreatment uptake studies indicate that 93 per cent of the toxic cases have an uptake higher than 45 per cent; clinical toxicity does not necessarily parallel uptake value in the toxic range.

4. The majority of patients require one treatment to achieve the euthyroid state; patients with greater clinical toxicity seem to require a larger number of treatments over a longer period of time.

5. The majority of cases require less than 10 millicuries and less than four months to achieve the euthyroid state.

6. The majority of post-treatment euthyroid cases show normal uptake; some lie above and others below these figures.

7. It would appear that almost all glands are reduced to a nonpalpable state by treatment with radioactive iodine.

8. All cases developing assumed permanent hypothyroidism in this study received only one treatment of radioactive iodine.

9. The incidence of hypothyroidism in our series approximates that in the literature, and is somewhat higher than that in surgically treated cases.

10. The prior use of antithyroid drugs does not alter the uptake of radioactive iodine in toxic cases provided the use of such drugs is stopped four or more days before the test is done.

11. There is no correlation between the pretreatment uptake and the dose of radioactive iodine necessary to induce the euthyroid state.

12. Radioactive iodine appears to be the treatment of choice in hyperthyroidism.

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## THE RELATIONSHIP BETWEEN THE STATE MENTAL HOSPITAL AND THE GENERAL PRACTITIONER*

WILLIAM L. KIRKPATRICK, M. D.
JACKSON, LA.

This paper discusses the inter-relationship between the state mental hospitals and the general practitioners in Louisiana as perceived by a state hospital staff member. The degree of association between the two differs from state to state according to many variable factors such as the number of state mental hospitals and out-patient clinics, the area and population of the state, the number and distribution of general practitioners and psychiatrists, and the statutory provisions governing commitments and separations from the hospitals.

Louisiana has a total area of 48,523 square miles and a population of over two and one half million. This area and population is served by only three state mental hospitals, each receiving its patients from a certain specified and legislated boundary. It can be readily seen that a relatively large area supplies patients to each of the state hospitals. In these large areas there are more general practitioners than any other type of medical consultant. Consequently, it is they who first see the potential state hospital patient, and form the first line of defense against mental illness. Furthermore, under the laws of Louisiana, the coroner and another physician, both frequently general practitioners, have the responsibility of initiating commitment to the state hospital with final approval by the court in all cases except emergency commitments.

In many states psychiatric out-patient clinics screen admissions to state mental hospitals and follow the progress of separated patients. In other states with a limited number of out-patient clinics the general practitioner performs this function to a limited degree during the course of his practice, resulting in a more direct state mental hospital-general practitioner relationship.

It is interesting to note that Louisiana was one of the earliest states to establish a state mental hospital with the establishment of the East Louisiana State Hospital at Jackson in 1847. In 1850, there were only fifteen state mental hospitals extant in the country. Since then they have grown rapidly and today there are over two hundred, housing approximately 475,000 patients. The rapid growth did not always reflect an increasing interest in the welfare of the mentally ill. Unfortunately, all too often, it represented an attitude of "out of sight, out of mind." Mental illness disturbed the equanimity of the public, and usually the basic desire was to remove these social irritants from the public eye. Fortunately, in the last decade the emphasis has shifted more and more toward treatment and away from mere custodial care and detention.

The number one problem of state hospitals throughout the country is overcrowding. This problem has existed in Louisiana for many years, but in recent years there has been considerable improvement. For example, in 1946, the state mental hospitals were 57 per cent overcrowded; in 1948, this had dropped to 49 per cent; and in 1949, to 38.5 per cent. Many obvious methods have been proposed to relieve this situation; e.g., the establishment of new prolonged care units, temporary care hospitals, private mental hospitals, more mental health clinics, and an increasing emphasis on prevention. A neglected consideration is the role the general practitioner plays in relieving state hospital congestion by treating, himself, many minor psychiatric disorders, carefully selecting hospital commitments and by channelling potential state hospital patients into other appropriate public

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care agencies, e.g., nursing homes, mental health clinics, V. A. hospitals, etc.

During the fiscal year 1952-1953, there were approximately 2,500 total and 1,863 first admissions to the three state hospitals; Central, East Louisiana and Southeast Louisiana Hospitals. A careful evaluation of the admission statistics reveals a certain number of admissions which possibly could have been avoided, and I want to emphasize the term "possibly" as final statistics frequently do not reveal the original situation in its totality.

Table 1 presents a diagnostic breakdown of total and first admissions to the state mental hospitals during the fiscal year 1952-1953. For comparison a diagnostic breakdown of all first admissions to the majority of U. S. state mental hospitals is included.

From the table it is seen, as expected, that our largest group of first and total admissions is schizophrenic reaction, approximately 34 per cent. This figure is larger than the national average of 25 per cent first admissions due in part to the fact that our statistics are based on two prolonged care and one acute treatment hospital. Could any of these admissions have been avoided? Probably not, but there are two subgroups falling in these categories which deserve further mention. One group is those pregnant women who become psychotic in the last two trimesters of pregnancy. They should be sent to the neuropsychiatric units of

TABLE 1

TOTAL ADMISSIONS AND FIRST ADMISSIONS TO THREE STATE HOSPITALS DURING FISCAL YEAR 1952-1953 AND FIRST ADMISSIONS—NATIONAL AVERAGE ALL STATE MENTAL HOSPITALS

| | 1952 - 1953 | | 1951 |
|---|---|---|---|
| | Total Adm. in La. | First Adm. in La. | First Adm. in U. S. State Mental Hosp.* |
| Psychotic Disorders, Psychogenic or Without Clearly Tangible Cause or Structural Change | | | |
| Schizophrenic Reactions | 34.40 | 33.70 | 24.60 |
| Manic Depressive Reaction | 7.00 | 4.30 | 4.38 |
| Involutional Psychotic Reaction | 2.88 | 3.00 | 4.60 |
| Total | 44.28 | 41.00 | 33.58 |
| Diseases of the Senium | | | |
| Senile Brain Disease | 4.19 | 5.30 | 11.60 |
| Cerebral Arteriosclerosis | 10.00 | 11.30 | 15.70 |
| Total | 14.19 | 16.60 | 27.30 |
| Alcoholic Disorders | | | |
| Acute Brain Syndrome Assoc. with Alc. Intox. | 3.21 | 3.60 | |
| Chronic Brain Syndrome Assoc. with Alc. Intox. | 2.93 | 3.40 | |
| Sociopathic Personality Disturbance Assoc. with Alc. Addiction | 5.82 | 4.30 | |
| Total | 11.96 | 11.30 | 12.30 |
| Mental Deficiency | 7.00 | 7.10 | 3.40 |
| Undiagnosed Cases | 5.16 | 1.80 | 3.20 |
| Central Nervous System Syphilis | | | |
| Meningoencephalitic Syphilis | 1.58 | 1.70 | 2.36 |
| Other C. N. S. Syphilis | 1.42 | 1.70 | .47 |
| Total | 3.00 | 3.40 | 2.83 |
| Psychoneurosis | 2.88 | 3.50 | 4.75 |
| Chronic Convulsive States | 2.30 | 2.20 | 1.80 |
| Personality Disorders, Antisocial Reaction | 1.18 | 1.01 | 2.30 |
| Other Conditions | 8.05 | 12.09 | 8.54 |
| Grand Total | 100.00 | 100.00 | 100.00 |

* 188 out of 201 U. S. State Mental Hospitals.

the large charity hospitals whenever possible if unable to pay for private psychiatric care. Residency in an overcrowded state hospital on an open ward with many unpredictable patients places them in a hazardous situation with a possibility of being injured. The second group is the psychotic veteran with the service connected disability. There is rarely an instance when he has to be committed to a state hospital. According to recent information made available from the V. A. contact office in Baton Rouge, the V. A. hospitals will provide admission within twenty-four hours for those veterans with service connected disabilities who need emergency hospitalization for a psychosis. The V. A. advises that the attending physician contact his local V. A. office during the day; if he is unable to locate the officer in charge, he should then call the nearest V. A. Hospital collect. If the need for hospitalization arises at night, they recommend that the attending physician call the nearest V. A. hospital which would serve his particular case. White males only are accepted at Gulfport, Mississippi; females are accepted at the V. A. hospital at Tuscaloosa, Alabama; and colored males are accepted at the V. A. hospital in Tuskegee, Alabama. In the event of an extreme emergency, all service connected veterans may be referred to the V. A. hospital in New Orleans and that hospital will transfer the patient to the proper hospital.

The next largest group for consideration are those patients with diseases of the senium which comprise approximately 16.6 per cent of our first admissions and approximately 14.2 per cent of total admissions. This percentage is considerably lower than the national average, again reflecting the statistical compilation and other factors. It is obvious that most of these patients with diseases of the senium have to be hospitalized immediately as usually the family waits until they can no longer manage the patient before asking for medical care. There is a group of borderline cases among these aged, however, where the patient may show only mild evidence of organic brain disease such as confusion, disorientation, irritability, or a mild behavioral reaction. These patients should be carefully considered before commitment is contemplated, for several reasons. Available statistics show an unusually high mortality rate of these patients with disease of aging admitted to state hospitals. In 1948, the mortality rate within the first year was approximately 42 per cent of all patients admitted with diseases of the senium. The mortality rate in Louisiana for diseases of the senium, however, was considerably less than the national average—approximately 29 per cent within the first year. This shockingly high mortality rate occurs despite the fact that the physical condition of many of these patients was good or average at the time of admission. It is speculated that the high death rate reflects the inability of the aged person to adjust to an entirely new environment due to a limited reactive capacity. He becomes worried and anxious due to the demands of adjustment, which taxes him physically and causes him more mental concern, eventually creating a vicious cycle detrimental to both his physical and mental health. It is very probable that an aged patient on the verge of delirium will be precipitated into the delirium merely by the actual procedure of commitment and subsequent change of environment.

The question naturally arises, if we do not commit these borderline cases, what can we do with them? Recent advances in the pharmacalogical treatment of these cases using metrazol, nicotinic acid, cytochrome C, or a combination of these, has shown such promising results that an empirical trial is indicated before final commitment is decided upon. Sol Levy of Seattle, Chesrow and co-workers, Swenson and Grimes, and others have reported favorably on the oral use of metrazol. Levy reported a series of 30 cases treated with metrazol and nicotinic acid in an elixir. Daily dosage was metrazol, grains three t.i.d., and nicotinic acid, 100 milligrams t.i.d. He found that 70 per

cent of his patients who were previously described as too sensitive or irritable became more easy going and more sociable with this therapy. His conclusion was that many of these borderline cases, with the use of these drugs or similar acting drugs, can be kept out of state mental hospitals and permitted to live in the community or approved nursing homes. Recently a group of aged patients was treated by your speaker at the East Louisiana State Hospital with metrazol, grains 3, three times daily, with promising results. Our series of 87 patients had an age range of 60 to 99 with an average age of 72 years. Their average length of hospital stay with 14.6 years with a range of less than six months to fifty-seven years. There was a wide variety of diagnoses in our group which are listed in Table 2.

Our patients were divided into a test group of sixty-five receiving metrazol and a control group of twenty-two receiving placebos. Five refused to take the medication, three in the test and two in the control group. Their progress was followed weekly using the Sol Levy modification of the revised Malamud Sands Rating Scale.

The rating was done by two attendants on each ward, both familiar with the patients, but independently of each other. In addition, psychological testing was done

TABLE 2

| Diagnostic Grouping: | | Total Age Range | | Length of Stay in Hospital Range: | |
|---|---|---|---|---|---|
| | | (60 - 99) | | (Less than 6 mos. to 57 yrs.) | |
| | | Age 60 | 2 | Less than 6 months | 7 |
| Schizophrenia | | 61 | 1 | 1 year | 7 |
| Hebephrenic | 1 | 62 | 2 | 2 years | 8 |
| Paranoid | 14 | 63 | 1 | 3 years | 6 |
| Simple | 2 | 64 | 3 | 4 years | 6 |
| Type Undetermined | 4 | 65 | 5 | 5 years | 5 |
| | | 66 | 6 | 6 years | 2 |
| Manic Depressive | | 67 | 7 | 7 years | 3 |
| Manic, Mixed | 3 | 68 | 6 | 8 years | 1 |
| Manic, Manic | 2 | 69 | 6 | 9 years | 1 |
| Manic, Depressed | 4 | 70 | 7 | 10 years | 1 |
| | | 71 | 2 | 11 years | 1 |
| Cerebral Arteriosclerosis | | 72 | 5 | 13 years | 1 |
| With Psychosis | 31 | 73 | 7 | 14 years | 2 |
| With Constitutional Syphilis | 2 | 74 | 4 | 15 years | 1 |
| | | 75 | 3 | 16 years | 2 |
| Senile | | 76 | 3 | 18 years | 1 |
| With Psychosis | 13 | 77 | 2 | 19 years | 2 |
| | | 79 | 2 | 20 years | 1 |
| Psychoneurosis Hypochondriasis | 1 | 80 | 1 | 22 years | 1 |
| | | 82 | 2 | 23 years | 1 |
| Without Psychosis | 1 | 84 | 1 | 24 years | 2 |
| Not Insane, Bilateral Cataract | 1 | 86 | 1 | 26 years | 3 |
| Adult Situational Reaction | 1 | 87 | 2 | 28 years | 2 |
| | | 88 | 1 | 29 years | 1 |
| Undiagnosed | 1 | 89 | 1 | 30 years | 1 |
| | | 90 | 1 | 32 years | 5 |
| Paranoia or Paranoid Conditions | 5 | 96 | 1 | 33 years | 2 |
| | | 99 | 1 | 38 years | 1 |
| Involutional Psychotic Reaction | 1 | Total — | 87 | 39 years | 1 |
| | | Average Age | | 42 years | 1 |
| Total | 87 | 72.01 Years | | 45 years | 2 |
| | | | | 48 years | 3 |
| | | | | 57 years | 1 |
| | | | | Total — | 87 |
| | | | | Average Length of Stay—14.6 years | |

TABLE 3
SOL LEVY'S MODIFICATION OF THE REVISED MALAMUD SANDS RATING SCALE

| | | | |
|---|---|---|---|
| Appearance | Neat | Feelings | Too sensitive and irritable |
| | Careless | | Easy going |
| Personal Habits | Able to attend to needs | | Too indifferent |
| | Has to be assisted | Speech | Spontaneous |
| General Activity | Active | | Uncommunicative |
| | Quiet | Memory | Good |
| Sociable | Mixes with others | | Fair |
| | Does not mix | | Poor |
| Attention | Alert | Work | Willing |
| | Dull or indifferent | | Disinterested |
| Mood | Elated | Eating Habits | Spontaneous eating |
| | Even | | Feeding problem |
| | Depressed | Sleep | Restful |
| | | | Restless |

prior to and following the completion of the therapeutic course, a total of twenty-eight days.

Our results were promising. There was improvement in 40 per cent of the test group with 9.5 per cent of the 40 per cent showing marked improvement. Test results showed a statistically significant trend. There was no statistically significant change in the control group with 80 per cent showing no change. It appears from the preceding data that an empirical trial with metrazol is indicated in the treatment of these aged borderline cases before commitment is arranged.

One of our major burdens during the last year was the treatment of alcoholic conditions. Approximately 12 per cent of our patients in the three state hospitals had disorders associated with alcoholism. The majority of these cases were not psychotic on admission and many of them were apparently sent to the state hospital for sobering up and forced abstinence. It is little less than useless to repeatedly recommit the same patient back to the hospital for sobering up purposes if he does not intend to cooperate with treatment. In many cases it is felt that the "drying out" and sobering up can be done at home, in a general hospital, or with the use of local facilities.

Seven per cent of our first admissions were mental deficients, twice the national average, and this apparently reflects the fact that in Louisiana state mental hospitals have become a repository for feeble minded patients who should be in a special institution for training and re-education.

Approximately 3 per cent of our admissions were psychoneurotics. Most of these cases could probably have avoided commitment by using the nearest mental health clinic or guidance center which are located in most of the large cities throughout the state.

Last year there were approximately 3,300 separations, either on furlough or parole or on a discharge status. Many of these separations are potential cases for the general practitioner as a certain percentage will relapse and be returned to the family doctor for management. If the patient is released on a furlough or parole status (that is, officially attached to the hospital for one year), he can be returned immediately accompanied by a statement from his attending physician that he is not suffering from a contagious disease.

The preceding has discussed briefly the relation between the state mental hospitals and the general practitioner during the movement of population (in and out) of the hospital. There is also a limited association during the time the patient is a hospital resident. This occurs when the family uses their attending physician as a liaison between themselves and the hospital for information about a hospitalized relative or friend.

It is the opinion of the writer that the state hospital can facilitate the dual relationship by providing any interested practitioner with (1) the latest available

information concerning commitment procedures, (2) the status of the patient on furlough or parole, (3) the names and addresses of approved nursing homes and mental health clinics, and (4) the common facts that the average family wants to know about the hospital when commitment is contemplated. The information could be made available through the coroners or the Department of Institutions. It is felt that this information, available at the fingertips of any committing physician, would help to establish rapport between the family and the physician. It could be the deciding factor in influencing agreement to civil commitment rather than to have the commitment enforced by public authorities with strained relations between the family, the general practitioner, and public authorities.

From the foregoing it can be readily seen that there is a constant and continued association between the general practitioner and the state mental hospital. The relationship does not stop with completion of commitment but continues throughout the patient's residency in the hospital and after he is separated.

The paper has also discussed possible alternatives in the handling of certain potential state hospital cases. I want to emphasize that it is not to be construed as a critical evaluation of the general practitioner's management of psychiatric disorders. The purpose of the paper is an attempt to contribute to some small degree towards a better mutual understanding between the two parties with the patient as the ultimate beneficiary.

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## SURGICAL ASPECTS OF MECKEL'S DIVERTICULUM *

POWHATAN W. JAMES, JR., M. D.
HOUSTON, TEXAS

Although Meckel's diverticulum is present in 2.0 [1] per cent of all individuals, it is only of surgical significance when one of its serious complications develops. It is the purpose of this paper to present twelve cases of Meckel's diverticulum that have been seen by the author between 1948 and 1954.

As early as 1672, Levator [2] reported a diverticulum of the terminal ileum; Ruysch, [3] in 1707, published the first illustration of a Meckel's diverticulum, but J. F. Meckel, [4] in 1812, first accurately described the anomaly and associated it with other congenital defects.

Zenker, [5] in 1861, found aberrant tissue in its wall; Deetz, [6] in 1907, found gastric mucosa in its wall and Deneke [7] associated this gastric mucosa with bleeding from ulceration.

### ETIOLOGY

Meckel's diverticulum results from incomplete obliteration of the vitelline duct early in fetal life. The intestine connects with the yolk sac by a wide communication. At the fifth week it gradually begins to narrow down and close off. Failure of complete closure may result in a variety of anomalies. Thompson [8] classifies these as shown in Figure 1.

If no closure occurs, the entire duct may remain open resulting in a fecal fistula

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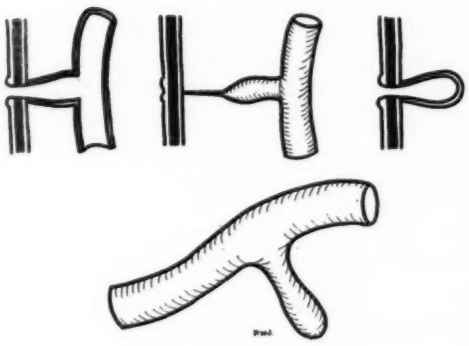

Figure 1

Upper left—Umblical type 6%
Upper center—Fibrous band connecting Meckel's diverticulum with umblicus 10%
Upper right—Blind pouch at umblicus 0.5%
Lower center—Typical Meckel's diverticulum seen in 82.5%

between the midgut and the umbilicus (6 per cent).

The distal end may close and leave a fibrous band connecting the midgut outpouching with the abdominal wall (10 per cent).

If the distal end remains patent a segment of mucosa is left at the umbilicus which secretes but does not connect with the intestinal lumen (0.5 per cent).

If both the proximal and distal ends close, an enterocystoma results (0.5 per cent).

If only the proximal segment remains open a blind pouch communicating with the lumen of the ileum results (82.5 per cent), known as a Meckel's diverticulum.

ANATOMY

The diverticulum has all of the coats of the intestine and usually arises from the antimesenteric border of the small intestine. It may have its own mesentery which connects it with the small bowel mesentery where it gets its blood supply.

The distance between the outpouching and the ileocecal valve has been found to be from 15 to 100 cm. The diverticulum may be from 0.1 to 10 cm. in length, usually of slightly less diameter than the ileum to which it connects, but one case [9] has been reported over 100 cm. long.

The lining of the diverticulum is the same as the ileum usually but heterotopic tissues are found in about 25 per cent [10] of the cases. Pancreatic, duodenal, gastric [5, 10-14] and colonic [15] tissue have been found in the sac wall. Of these, gastric ectopic tissue is the most important because of its ability to form peptic ulcers.

Free hydrochloric acid [16] and pepsin have been found within the lumen and are identical with that produced by the peptic ulcers in the upper intestinal tract. The ulcer is not in the patch of gastric cells but is usually in the mucosa of the ileum at its junction with the ectopic tissue.

CLASSIFICATION

Greenblatt's [17] classification divides these into the peptic ulcer group, the obstructive group, the diverticular group, the umbilical group, the tumor group and the incidental group. (Table 1).

TABLE 1
GREENBLATT'S CLASSIFICATION

| | |
|---|---|
| I. Peptic group | III. Diverticular group |
| II. Obstructive | |
| A. Intussusception | IV. Umblical group |
| B. Volvulus | |
| C. Littre's hernia | V. Tumor group |
| D. Bands and adhesions | VI. Incidental group |

PEPTIC ULCER GROUP

Peptic ulcer with hemorrhage or perforation is a frequent complication of early childhood. Rectal bleeding of often large quantities either bright red, partly clotted to tarry or chocolate colored stools has been seen. (Figure 2).

These children have pain at or near the umbilicus and will draw up their legs and cry when the cramp occurs.

OBSTRUCTIVE GROUP

The obstruction may be brought about by intussusception [18] of the diverticulum due to the relatively wide mouth of the sac which allows invagination of the sac into the ileum.

A volvulus of the intestine around the fixed diverticulum or obstruction of other loops of bowel beneath the fibrous remains of the yolk stalk may occur.

Obstruction may result from incarceration of a Meckel's diverticulum in an um-

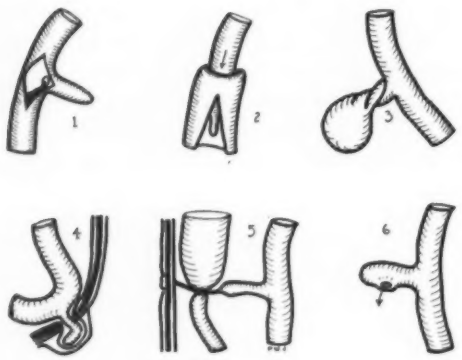

Figure 2

1. Bleeding peptic ulcer in diverticulum.
2. Intussusception of Meckel's diverticulum.
3. Volvulus of Meckel's diverticulum.
4. A Littre's hernia.
5. Obstruction of gut beneath fibrous band connected to Meckel's diverticulum.
6. Perforation of an acutely inflamed Meckel's diverticulum.

bilical, inguinal, or femoral hernia. These are called Littre's hernias.[19]

The pain is usually generalized, occurs in waves which increase in intensity and then subside only to recur again in several minutes.

DIVERTICULAR GROUP

The inflammatory process is similar to that of appendicitis and is indistinguishable from appendicitis preoperatively.

Acute diverticulitis is perhaps not more often found because the contents of the small bowel are liquid and can pass readily in and out of these wide mouthed outpouchings. Whether the process is acute or chronic, perforation with peritonitis is a serious complication. The inflamed diverticulum may adhere to other organs or intestine causing a pivot point for a volvulus or an obstruction of other involved gut which may strangulate through the opening.

UMBILICAL GROUP

Open lesions at the umbilicus are easily recognized at birth and can be diagnosed by the injection of radiopaque material into the fistula which is seen to connect with the intestine. This differentiates it from a patent urachus which communicates with the urinary bladder.

TUMOR GROUP

Either benign lesions such as enterocystoma, carcinoid, adenoma or mesodermal tumors or malignant lesions such as carcinoma or sarcoma have been reported[20].

INCIDENTAL GROUP

The incidental group includes those diverticula which produce no distinguishing symptoms and are found incidentally. The pain in this group is often dull, vague, and of chronic nature. Interference with normal peristalsis of the ileum is thought by some to cause the pain.

Table 2 shows the percentage of the complications observed in 1605 cases reviewed by Moses[21] in 1947.

TABLE 2
COMPLICATIONS IN 1605 CASES OF MECKEL'S DIVERTICULUM

| | Number of Cases | Percentage |
|---|---|---|
| Hemorrhage | 496 | 30.9 |
| Intestinal obstruction | 383 | 23.8 |
| Perforation | 222 | 13.8 |
| Littre's hernia | 188 | 11.7 |
| Simple diverticulitis | 165 | 10.3 |
| Umblical fistula | 36 | 2.2 |
| Foreign body | 32 | 2.0 |
| Umblical polyp | 28 | 1.8 |
| Cancer | 24 | 1.5 |
| Others | 31 | 1.9 |

DIAGNOSIS

Unless an umbilical type is present a definite diagnosis of Meckel's diverticulum cannot be made preoperatively. Bleeding from the rectum in the first three decades of life should make one strongly suspicious of an ulcerated Meckel's diverticulum.

The bleeding may be profuse with sudden onset or it may be intermittent and slight. The blood is usually dark rather than bright red or tarry and clots are often present.

Obstruction from Meckel's diverticulum has no cardinal diagnostic features and does not differ from obstruction from other causes.

X-ray demonstration of a Meckel's diverticulum is quite rare. Mottram[22] and Garland, in 1945, collected only 21 cases found by x-ray. If serial films of the

barium as it passes through the small bowel are taken, a higher incidence will be expected to be found. However, most investigators have discarded x-ray studies as a method of diagnosis.

At surgery, Jay[23] has recommended that at least the terminal 5 feet of ileum be examined for Meckel's diverticulum because 28 per cent lie more than 36 inches from the ileocecal valve.

Search for Meckel's diverticulum is necessary in all cases where intestinal bleeding has been a symptom or when the anticipated lesion is not encountered during laparotomy.

### TREATMENT

The treatment of this lesion is surgical excision. It is unwise to invaginate the sac because of the possibility of gastric mucosa being present in the base with subsequent hemorrhage or perforation. Also inversion of the stump by purse string suture may encroach upon the small bowel circumference producing an intestinal obstruction.

We have used an Allen anastomosis forcep placed transversely across the base of the incidental diverticulum with inversion of the stump using catgut suture reinforced with cotton sutures. In these cases which were bleeding or acutely inflamed or obstructed, small bowel resection with end-to-end anastomosis is by far the safest method of management.

### CASE REPORTS

*Case No. 1.* A sixty year old white carman was admitted to the hospital October 12, 1949, complaining of bleeding from the rectum. The patient had been well until the day prior to admission when he developed a "sluggish" feeling which was followed by a "drowsy" one resulting in extreme fatigue. On the evening of his admission he had a normal bowel movement about 3:30 P.M. At 5:30 P.M. he felt bloated and had a desire to defecate and upon stooling he noticed a large amount of bright red blood intermingled with dark red blood clots. Following this he became quite dizzy and almost fainted. He ate a big supper which he promptly vomited. He gave no history of previous melena and to his knowledge had no rectal trouble. His bowel movements had been entirely normal except for an occasional pain in his lower left abdominal quadrant which was relieved with milk of magnesia. His weight had remained stable and he felt normal until the day of admission.

Physical examination revealed a pale otherwise normal male of stated age. There was a generalized lower abdominal discomfort increased by deep pressure over the colon, particularly the sigmoid. No localized tenderness was found. There was a slight increase in tympany over the lower abdominal quadrants. Rectal examination revealed a good sphincter muscle tone. No external hemorrhoids or fissures were found. No tumor masses were palpable. Dark blood was seen grossly on the examining finger. The prostate gland was normal.

Proctosigmoidoscopic examination October 13, 1949, failed to demonstrate any bleeding point in the lower 13 inches of bowel. Blood was seen coming from higher up the bowel into the scope.

Upper and lower gastrointestinal series of roentgenograms were negative for any ulcerations, tumors, or disease processes, on October 14, 1949.

Because this patient continued to bleed profusely from his bowel in spite of blood transfusions for two days and in view of negative stomach and colon x-rays, it was felt that the most likely source of bleeding was a Meckel's diverticulum.

On October 15, 1949, the abdomen was opened through a right paramedian incision. A Meckel's diverticulum was found approximately 10 cm. from the ileocecal valve which measured 5 cm. in length. Contained within its lumen and the ileum distal to it and the entire colon and rectum, was a large amount of recent and old blood. There was no acute serosal inflammation but near the base of the diverticulum, an indurated, thickened area was noted, evidence of mucosal ulceration. The appendix was normal.

The diverticulum was resected and the stump closed in the usual manner. An incidental appendectomy was performed.

Postoperatively, on the ninth day the patient developed a pulmonary infarct which responded to anticoagulant therapy.

He was dismissed from the hospital on the thirty ninth day postoperatively.

Pathological report: Meckel's diverticulum with chronic inflammation. Appendix, histological.

*Case No. 2.* A ten year old white boy was admitted to the hospital February 7, 1954. He began passing red blood per rectum February 4, 1954, at home and continued to bleed in large quantities. Some of the blood was clotted, dark in color but also bright red. (He had no abdominal pain, diarrhea, abnormal stools, fever or other bleeding tendencies.)

Physical examination on admission revealed the skin and mucous membrane to be pale but no petechiae were found. The heart and lungs were normal. Abdominal examination was negative for palpable masses, tenderness or herniae. The liver and spleen were not palpable. No anal lesions were felt.

Sigmoidoscopy revealed blood coated rectal mucosa but no active bleeding site was found.

On admission the blood count was hemoglobin 7.0 gms., red blood count 2.69 million, white blood cells 5,650 with 2 stabs, 62 segments, 33 lymphocytes, and 3 monocytes. Hematocrit was 21. Bleeding time was 3'00", clotting time 4'50", and platelet count 74,000.

This patient had three tarry stools February 8, 1954, and it was felt that his hemorrhage was coming from the upper gastrointestinal tract.

In spite of blood replacement this boy continued to bleed. On February 10, 1954, at 2:30 A.M., he had a severe hemorrhage, his pulse was 130 and he vomited clear fluid. A diagnosis of bleeding Meckel's diverticulum was made and the patient was taken to surgery. Under general anesthesia a short right paramedian incision was made and the abdomen was explored. A large, distended, tense Meckel's diverticulum 7 cm. in length, which had a hemorrhagic change in its distal end, was found approximately 30 cm. from the ileocecal valve. The small bowel contained dark blood. A clamp was placed transversely across the base of the diverticulum and it was excised. The opening in the ileum was then sutured with an inner layer of 000 chromic catgut and an outer layer of 000 cotton. The abdomen was then closed in layers. The patient was given 500 cc. of whole blood during surgery.

Postoperative recovery was satisfactory. The patient went home on the sixth postoperative day.

Pathological diagnosis: (1) Meckel's diverticulum, (2) Meckel's diverticulum, ectopic gastric mucosa, and (3) Meckel's diverticulum, ulcer, chronic, active, with erosion of blood vessel and hemorrhage.

*Case No. 3.* A thirty six year old white woman, seven months pregnant, was admitted to the Obstetrical Service, October 13, 1953, with a diagnosis of acute gastroenteritis. Abdominal cramps began October 12, 1953, were mild in character and caused upper abdominal discomfort. No uterine contractions were found on admission. Her estimated date of confinement was December 3, 1953. Her previous laboratory work had revealed negative serology and Rh positive blood.

An appendectomy had been performed three years previously.

On October 16, 1953, vomiting of dark brown material began and pink vaginal discharge appeared. Her abdomen was distended, definitely larger than on admission, tympanitic above the uterus and bulging in the flanks. No perstaltic sounds were heard and she was tender in her lower right uterus.

X-ray of abdomen made October 16, 1953, revealed several loops of small bowel in the upper abdomen with moderate distention but without complete obstruction. It was believed to be in the jejunum and secondary to the pregnancy.

Surgical consultation was obtained, Wangensteen suction was started on a Levin tube and all feedings by mouth were stopped.

On October 17, 1953, labor began and at 9:30 P.M. a vaginal delivery was completed under saddle block anesthesia.

After delivery the patient's abdomen remained quiet for thirty-six hours then cramping abdominal pain began again. X-ray of the abdomen on October 19, 1953, revealed an increase in the abdominal gaseous distention with numerous fluid levels demonstrated.

At 7:30 P.M. on October 19, 1953, this patient was explored because of small bowel obstruction.

Under spinal and sodium pentothal anesthesia, the abdomen was opened through a short right paramedian incision. Numerous loops of dilated small bowel were seen. Approximately 20 cm. from the ileocecal valve there was a Meckel's diverticulum 5 cm. long which was acutely inflamed and plastered with an exudate to the fundus of the uterus and right broad ligament. The ileum attached to the Meckel's diverticulum was markedly edematous and partially twisted upon itself to produce a nearly complete obstruction. The bowel distal to the diverticulum was collapsed.

While freeing the diverticulum from the uterus and broad ligament, the diverticulum was torn at its base and a small amount of spillage of the contents of the bowel lumen resulted.

The Meckel's diverticulum and associated segment of small bowel were removed and an end-to-end anastomosis of the resected gut performed, using a continuous "baseball" stitch of 000 chromic catgut reinforced with an outer layer of interrupted cotton serosal sutures. The defect in the mesentery was closed, the abdomen was closed in layers without drainage.

Peritonitis with ileus resulted postoperatively with a wound infection. All responded to massive antibiotic therapy, fluid replacement and gastric suction.

Gradual improvement resulted and the patient was allowed to go home on the nineteenth postoperative day.

Pathological report: Meckel's diverticulum, diverticulitis, acute and chronic.

*Case No. 4.* A sixty seven year old white woman was admitted to the hospital February 15, 1950, complaining of left lower abdominal quadrant pain, nausea and vomiting, fever and no bowel movement for four days' duration. The onset of pain she described as "feeling like a whirlwind looks". The pain increased in intensity, nausea and repeated vomiting resulted with increasing lower abdominal colicky pain.

She was admitted to the hospital with fever 101° F. and a leukocytosis of 12,900 with 85 per cent polymorphonuclear leukocytes and a negative urine examination.

X-rays of the abdomen showed a small bowel obstruction with gas filled loops of small intestine.

(1) Small bowel obstruction, (2) diverticulitis, and (3) appendicitis, acute, were the three preoperative diagnoses considered.

On February 15, 1950, after correcting her fluid imbalance she was taken to the operating room, given a spinal anesthetic and a midline incision was made.

A gangrenous Meckel's diverticulum approximately 6 cm. long and 15 cm. from the ileocecal valve was adhered to the posterior wall of the uterus. The loop of small intestine, attached to the Meckel's diverticulum had twisted upon itself producing a strangulation. Proximal to the volvulus, the bowel was markedly distended.

Resection of 20 cm. of gut containing the gangrenous diverticulum was performed with end-to-end anastomosis of the bowel in the usual manner. The appendix was also removed in a routine manner.

Postoperative recovery was quite satisfactory and she was dismissed from the hospital on the eighth postoperative day.

Pathological report: (1) Hemorrhagic necrosis of the ileum; (2) acute Meckel's diverticulitis; and (3) obliterated appendix.

*Case No. 5.* A forty eight year old white housewife was admitted to the Gynecological Service on February 8, 1954, because her gynecologist suspected a carcinomatous uterus.

She had been bleeding off and on for several months and her menstrual flow had been excessively heavy.

At the age of eight, a tumor of the small intestine along with 4 inches of intestine had been removed. When seventeen years old she had an intestinal obstruction requiring surgery.

Physical examination on admission revealed an old right lower quadrant scar and an old well healed midline scar. On pelvic examination, the uterus was enlarged about 18 to 20 cm., was irregular in outline, movable and only slightly tender. The remainder of her examination was negative except for a 9.7 gm. hemoglobin and 4.03 million red blood cells.

This patient was transfused with 500 cc. of whole blood on February 8, 1954, and again on February 9, 1954, which raised her hemoglobin to 12.9 gm. and 5.25 million red blood cells.

On February 10, 1954, after a dilation and curettage was done, the abdomen was opened through the midline suprapublic scar.

The small intestine was firmly adherent in the right lower quadrant and a hard mass was felt in the small bowel in the lower abdomen.

I was called in surgical consultation and while scrubbing, the large myomatous uterus was removed along with the cervix, tubes, and ovaries by the gynecologist.

The adhesions were freed from the small intestine involved in the hard mass and a large diverticulum found which contained a fecalith. This segment of bowel containing the sac had been excluded from the gastrointestinal tract by a proximal side-to-side anastomosis of the jejunum.

The diverticulum was removed transversely and closure of the small bowel performed in a routine manner using an inner layer of catgut and an outer layer of cotton.

Postoperative recovery was satisfactory, her Levin tube was removed on the fourth postoperative day and feedings started by mouth. She was dismissed on the eleventh postoperative day.

Examination of the diverticulum revealed its measurements to be 6 cm. long, 4 cm. in diameter at its distal end and 3 cm. in diameter in its proximal end. Contained within the lumen was a large fecalith which completely filled the distal lumen.

Microscopically, ectopic gastric mucosa was found in the lining of the diverticulum.

*Case No. 6.* A thirty year old fireman was admitted to the hospital on March 12, 1950, with abdominal pain, nausea and vomiting for three hours duration. The pain began in the epigastrium and then moved to the right lower quadrant. No history of genitourinary difficulty.

Physical examination revealed localized tenderness in the right lower quadrant of the abdomen increased on straight leg raising.

Laboratory examination revealed a negative urinalysis, a white blood count of 16,300 with 53 segmentals, 15 band forms, 1 juvenile, 28 lymphocytes, and 3 eosinophiles.

A diagnosis of acute appendicitis was made and the patient operated under spinal anesthesia. An acute inflammation was found in the appendix and in addition a Meckel's diverticulum, 60 cm. from the ileocecal valve. Appendectomy and diverticulectomy were performed in a routine manner. Postoperative recovery was satisfactory and he was dismissed on the seventh postoperative day.

Pathological report: Acute appendicitis plus a normal Meckel's diverticulum.

*Case No. 7.* A forty three year old Mexican laborer was admitted to the hospital complaining of recurrent attacks of gallbladder colic for fifteen months duration. A nonfunctioning gallbladder was found on two cholecystograms, therefore, the patient was operated upon on May 5, 1954. A gallbladder was found which contained several large stones. After removal of the gallbladder a 6 cm. long Meckel's diverticulum was found about 35 cm. from the ileocecal valve on the antimesenteric border.

The sac was removed transversely and the defect closed with a double layer of catgut reinforced with cotton.

Pathological report: (1) Cholecystitis with cholelithiasis, and (2) Meckel's diverticulum.

Postoperative recovery was satisfactory and the patient was dismissed on the twelfth postoperative day.

*Case No. 8.* A fifty four year old foreman was admitted to the hospital May 19, 1952, for removal

of a polyp of descending colon which had been found on previous colon x-ray examination.

He gave no history of melena or blood per rectum. Past surgery included an inguinal hernia repair on February 18, 1952, and hemorrhoidectomy March 7, 1952.

Physical examination was normal as was the laboratory work.

On May 26, 1952 under spinal anesthesia the abdomen was opened through a left rectus muscle splitting incision. Exploration of the abdominal viscera revealed a 2.5 cm. long Meckel's diverticulum in the small bowel 50 cm. from the ileocecal valve and a palpable polyp in the descending colon.

The Meckel's diverticulum was excised and the defect closed in two layers and a sleeve resection of the colon performed with end-to-end anastomosis, using two layer closure. Incidental appendectomy was performed.

Pathological diagnosis: (1) Colon, polyp, benign, (2) Meckel's diverticulum, and (3) appendix, histological.

Postoperative recovery was quite satisfactory and he was dismissed on the seventh postoperative day.

*Case No. 9.* A forty two year old white fireman was admitted to the hospital on February 21, 1950, for further studies of a colon polyp which was discovered on barium enema previously. The polyp was again seen on repeat barium enema, therefore, his colon was prepared for surgery.

Through a left rectus paramedian incision, the abdomen was opened. The polyp was found in the mid-descending colon and removed by wide excision. A 3.5 cm. Meckel's diverticulum was found incidentally, 50 cm. from the ileocecal valve, and was removed along with the appendix.

Pathological report: Meckel's diverticulum of ileum, histological appendix, and polyp of colon, benign.

*Case No. 10.* A twenty year old white messenger was admitted to the hospital October 26, 1948, complaining of abdominal pain for eight days. The pain was upper abdominal and cramping in nature at first and then became constant and shifted to the right lower quadrant. A diffuse tenderness over the entire abdomen was found with the tenderest area under the right costal margin. No abdominal masses were palpable and there was no rebound tenderness. On October 28, 1948, surgical consultation revealed bilateral rectal tenderness, right lower quadrant tenderness with rebound tenderness. The abdomen was opened and the appendix was found in a retrocecal position without any acute inflammation being evident. The appendix was removed in a routine manner. There was found a 3.0 cm. long Meckel's diverticulum, 60 cm. from the ileocecal valve, which was removed with closure of the ileum in a transverse manner.

Postoperative recovery was satisfactory and he was dismissed on the sixth postoperative day.

Pathological report: Appendix histological, Meckel's diverticulum.

*Case No. 11.* A thirty two year old electrician was admitted to the hospital December 2, 1953, complaining of abdominal pain for three days duration. His pain was sharp and colicky in his right lower abdomen. Nausea but no vomiting had resulted. Three previous attacks of similar pain with a diagnosis of appendicitis had been made one year previously.

Abdominal examination revealed moderate tenderness in the right lower quadrant but no rebound tenderness, a positive Rovsing's sign, right rectal tenderness, and audible bowel sounds.

A preoperative diagnosis of subacute appendicitis was made.

At surgery a normal appearing appendix was found which was removed. Search for Meckel's diverticulum revealed a small, wide mouthed sac approximately 2.5 cm. long and 80 cm. from the ileocecal valve. This diverticulum was removed transversely and closed with an inner layer of catgut and an outer layer of cotton.

Pathological report: Appendix, normal; Meckel's diverticulum without inflammation.

Postoperative recovery was satisfactory. The patient was dismissed on the thirteenth postoperative day.

*Case No. 12.* A thirty year old white welder was admitted to the hospital July 24, 1951, complaining of abdominal pain for four days. He first noticed aching cramping pain in the epigastrium and back. He took a laxative and the pain subsided. His local doctor examined him and made a diagnosis of acute appendicitis on evidence of right lower quadrant pain on pressure. He was sent to the hospital for an appendectomy.

Examination on admission revealed the abdomen to be flat, nontympanitic, and localized tenderness was found in the right lower quadrant without rebound tenderness.

On July 27, 1951, the abdomen was opened and a normal appendix was found and removed. Approximately 90 cm. from the ileocecal valve was a Meckel's diverticulum which had a broad base and was 3.0 cm. long. This was removed in the usual manner by clamping across its base transversely and closing the defect with catgut and cotton.

Pathological diagnosis: Histological appendix and Meckel's diverticulum. No inflammatory process was found in either specimen removed.

An uneventful recovery was made and the patient was dismissed on the seventh postoperative day.

## DISCUSSION

The youngest patient was ten years old, the oldest was sixty seven years old. There were three females and nine males with an average age of fifty years and

thirty five years, respectively. The average age length of Meckel's diverticulum was 4.2 cm. The average distance from the ileocecal valve was 49.1 cm. All twelve cases had the sac arising from the antimesenteric border of the bowel.

Two cases were suspected of bleeding from a Meckel's diverticulum preoperatively, two cases had small bowel obstruction associated with the Meckel's diverticulum. The remaining 8 cases were found incidentally at surgery, associated with appendicitis in 4 cases, with colon polyps in 2 cases, with cholecystitis in 1 case, and with uterine myomas in 1 case.

One case had a fecalith in it and had apparently been acutely inflamed previously, since proximal shunt anastomosis had been done. Three of the 12 cases had ectopic gastric mucosa in the sacs. Two cases out of 12 required small bowel resection along with the diverticulectomy.

The average hospital stay was 12.2 days. Postoperative complications included a pulmonary infarction in Case No. 1, prolonging his hospital stay to thirty-nine days and peritonitis in Case No. 3 with secondary wound infection.

There were no operative deaths.

SUMMARY

1. Acute abdominal disease plus passage of blood per rectum, especially in children, should suggest a Meckel's diverticulum.

2. The etiology, anatomy, classification, pathological complications, and treatment are discussed.

3. When feasible, the terminal ileum should be routinely examined in every abdominal operative procedure and if a Meckel's diverticulum is found, it should be excised or an ileal resection done.

4. Twelve cases of Meckel's diverticulum are presented, 4 producing symptoms and 8 being found incidentally.

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## INSULIN PREPARATIONS IN THE TREATMENT OF DIABETES MELLITUS *

DANIEL W. HAYES, M. D. †
NEW ORLEANS

Because the inadequate methods of treating diabetes mellitus were responsible for the death of many patients before 1921, it was most necessary that Banting and Best's discovery of insulin be immediately utilized in the only available form at that time. In the past thirty-three years its physiological uses in the body have not changed, but the timing of its action has differed vastly from the original product because of various modifications, including a new type soon to be available in the United States.

Of the varying degrees of severity of diabetes mellitus only the categories of the severe diabetic and the diabetic with acute complications will be considered in this discussion, since only these groups need insulin treatment. About 50 per cent of diabetics can be treated by diet alone.

The type of insulin needed in the individual case must be chosen with some care. The physician must never allow himself to become habituated to the use

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† Section of Internal Medicine, Mahorner Clinic; Clinical Instructor in Medicine, Louisiana State University School of Medicine.

of only one type of insulin. Acquaintance with characteristics of each type of insulin and with the proper indications for use of each type of insulin is essential to good modern management of diabetes.

### INSULIN TYPES

Since timing of the various insulins now in common use is the only variable among the various preparations, this subject is most important. (Table 1) A

TABLE 1
CLASSIFICATION OF INSULINS

| |
|---|
| Quick acting, short duration |
| Regular Insulin |
| Semilente Insulin |
| Intermediate in action and duration |
| N.P.H. Insulin |
| Globin Insulin |
| Lente Insulin |
| Slow acting, long duration |
| Protamine Zinc Insulin |
| Ultralente Insulin |

The timing of the peak action and duration of action is grouped into three groups.

quick-acting insulin of short duration is familiar to us all as unmodified, regular, or crystalline insulin. Less familiar to us in this country is a similar insulin developed in Denmark known as semilente insulin. We are also acquainted with the widely used intermediate insulins with a moderately long action which have an onset of action slower than the unmodified insulin. Globin, N.P.H., and now lente insulin, are examples of this type. Protamine zinc insulin and ultra-lente are long acting and slow in onset of action and they have less intense action at the peak.

### INSULIN TIMING

A typical curve of action for each of the three categories of insulins when given subcutaneously to a fasting diabetic of moderate severity, who has had no insulin for at least three days and who has been maintained on a steady diabetic diet during that time, is presented in Figures 1, 2 and 3. The prompt fall in blood sugar of this individual with a peak action within three to six hours and a relatively short duration of effect of less than ten hours is well known (Fig. 1). The less intense, less prompt, but somewhat longer duration of the intermediate insulins makes them probably the most useful of all types of insulins (Fig. 2). Finally the long-action type of insulin has

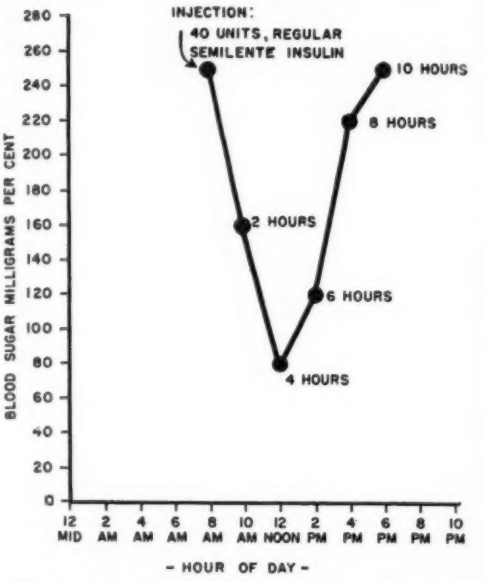


Figure 1. Average blood sugar curve following injection of a moderate dose of a quick acting insulin in a diabetic without previous insulin. The peak action occurs in four hours and the effect is gone in ten to twelve hours.

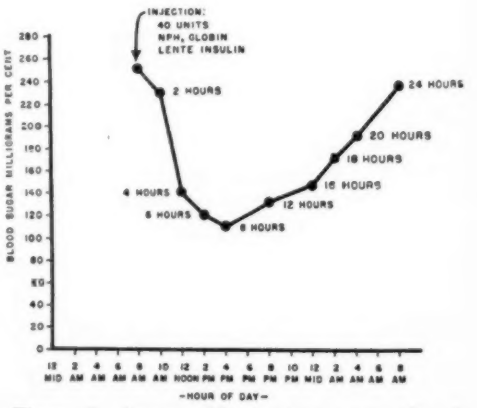


Figure 2. Average blood sugar curve after injection of an intermediate modified insulin in a diabetic. The peak action is slower, between six to ten hours and usually lasts twenty-four to twenty-eight hours.

a delayed action and much less intensity at its peak, since the insulin is released so slowly (Fig. 3).

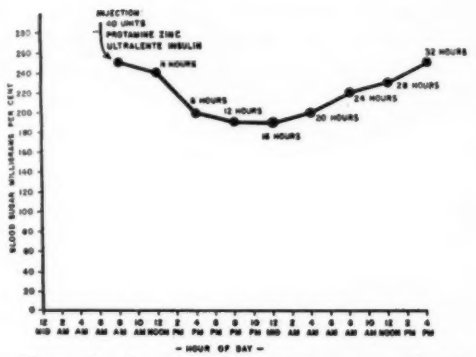


Figure 3. Average blood sugar curve after injection of a long-acting insulin. Here the peak action is less intense, and more prolonged. The duration of action may be as long as three days.

### CHOICE OF INSULIN

A presentation of the proper time in the proper case to use each insulin would be the ideal of a dogmatic discussion of this subject. Diabetes must never be dogmatized or standardized, or we will make grave and often fatal errors of judgment.

### MILD DIABETES

Of the mild cases of the diabetics who have the disease of sufficient severity to warrant insulin, a small single dose of a long-acting insulin or of an intermediate insulin is very satisfactory.

Since protamine zinc insulin is released slowly from its insoluble compound, there is some overlapping of doses. The full effect of a series of daily doses is not attained until after three days; thus, when beginning or terminating or changing the dose of this type of insulin it is necessary to judge the effect of one-third of the dose each day. After three daily injections, the level of insulin dose is fairly constant. The main time of peak action of protamine zinc insulin is between eighteen to twenty-four hours and thus there tends to be fasting hypoglycemia, especially with higher doses and less action to control postcibal hyperglycemia. These facts are not disturbing since, in the mild diabetic, there is little necessity for hour-to-hour control. It is advisable not to use protamine zinc insulin alone in doses higher than 40 units.

### MODERATELY SEVERE DIABETES

The more severe diabetic who will probably not be controlled well with protamine zinc insulin should use a modified insulin, either protamine zinc mixed with regular in a ratio of two parts regular to one part of protamine zinc or faster acting and less prolonged mixtures using higher ratios, two and one-half or three of regular insulin to one part of protamine zinc insulin. N.P.H. and globin approximate the timing of a 2:1 mixture. A mixture of less than 2:1 ratio should not be used since it acts like protamine zinc insulin alone. These insulins control the moderate and heavy postcibal hyperglycemia when given before breakfast. Then, too, there is less tendency for any nocturnal hypoglycemia at high dosage, which can be dangerous. Dosage of these insulins is not limited, and varies from 10 units to doses as high as several hundred units, although often at such high doses a single injection may not be satisfactory.

### SEVERE DIABETES

The severe diabetic, often a juvenile diabetic, is a special problem which must be studied carefully to determine the insulin requirement, especially as related to diet and exercise, since these may be very variable factors as difficult to control as the insulin dose. Glycosuria occurs frequently and unpredictably and insulin reactions occur without warning. Single doses, often high, of N.P.H., or globin insulin may be satisfactory. If there is nocturnal hypoglycemia with evening glycosuria, then switching to a single injection of a mixture of 2½ or 3:1 ratio of regular to protamine zinc insulin with faster peak action and a shorter duration usually controls these cases.

### LABILE DIABETICS

Many labile (brittle) diabetics, however, are never controlled on a single insulin injection of any type. Usually the best technique here is to use two injections of a modified insulin daily. Injections of N.P.H. or globin, or a 2½ to 3:1 ratio of insulin given using two-thirds of the total dose before breakfast and one-third before the evening meal (about twelve hours later) will control almost

100 per cent of these people without much difficulty.

### "LENTE" INSULINS

Before discussing emergency treatment with insulin, it would be well to mention the newly developed types of insulin. Since 1952, a group in Denmark [3] and then others in England have been using these insulins which differ from protamine and N.P.H. insulins in that an acetate buffer is used instead of a phosphate buffer. In using this buffer, crystalline insulin may be used without the need for adding protamine or other agents to prolong the insulin and make it insoluble. Ultra-lente is made of three times crystallized insulin and consists of insulin crystals which are slowly absorbed and produce a blood sugar curve similar to protamine zinc insulin. Semi-lente is also made of pure insulin crystals but precipitated in an amorphous physical state, thus rendering it easily and quickly absorbable, similar to our regular insulin. Lente insulin, the only kind to be marketed in this country, is a mixture of 30 per cent semi-lente and 70 per cent ultra-lente and has an action similar to N.P.H. and globin, with perhaps a slightly faster onset of peak action and slightly longer in duration. Eli Lilly and Co. will market this insulin, since it already has F.D.A. approval [2], some time this summer. These insulins are not miscible and cannot be used in combination with any of the other insulins now commercially available.

The advantages of lente insulin are several. First, there is no possibility of any allergy developing to it since there is no foreign protein in the insulin. Secondly, it has been found not to produce any local reaction or fat atrophy even when injected in the same area repeatedly. Finally, it has been found to provide control of some severe diabetics in a single dose better than a single dose of any other modified insulin. Disadvantages include the confusion that may exist to adding one more insulin preparation to the commercial market. Another disadvantage is that it may be misused and mixed with another type of insulin. It cannot, like other long-acting insulins, be used in the treatment of coma. Adequate publicity to the medical profession, however, should insure its proper and adequate use.

### EMERGENCY TREATMENT OF ACUTE COMPLICATIONS

Acute illness, operations or trauma, and acidosis require emergency treatment. This discussion should not be considered adequate for the proper treatment of these complications since it will touch briefly only on the relation of insulin to these complications.

If the patient has been taking a usual dose of his depot insulin, it should be continued without varying the dose. In addition, the patient should be on the proper program of six-hour management with urine tests made on fresh urine, regular unmodified insulin given and a diet containing 40 grams of glucose or its equivalent given orally or parenterally every six hours as outlined originally by Woodyatt and refined by Colwell [1]. With this plan most complicated diabetes should be under control within twenty-four hours.

### COMA

When the patient is in coma the initial dose of regular insulin should be larger (80 to 200 units), and often half or all of it should be given intravenously to insure proper absorption, even though the action, since insulin acts as an enzyme to promote glucose utilization, cannot be speeded much. Then subsequent doses can be judged by response at the end of three to six hours. If no lessening of dyspnea or vomiting (two most important signs in coma) is seen in four hours, the initial dose should at least be doubled and given again intravenously.

With return to consciousness and reduction of the total insulin requirement, depot insulins may be used to replace the regular insulin. These will be adequate when given in one dose to equal the total dose of the regular insulin. The patient at that time resumes his three-meal feeding.

### SUMMARY

Insulin may be life saving and when used in the proper manner makes manag-

ing diabetics easier, less complicated, and far better for the patient as well as the physician.

Mild diabetics who cannot be controlled on diet alone may be give 10 to 40 units of protamine zinc, N.P.H. or globin insulin once daily before breakfast.

Moderately severe diabetics requiring more than 30 or 40 units of insulin can be controlled on larger doses of N.P.H. or globin insulin given once daily before breakfast.

Severe diabetics may be fairly well controlled on N.P.H. or globin once daily, although some will achieve better control with a mixture of 2½ or 3 parts of regular insulin to 1 part of protamine zinc insulin. This provides a faster peak of action and somewhat shorter duration of action to better control postcibal hyperglycemia and to avoid nocturnal hypoglycemia.

Labile diabetics often need two injection of N.P.H. or globin insulin each day, usually two-thirds of the total dose in the morning, and one-third twelve hours later.

Lente type insulins are described briefly and the advantages and disadvantages of the one new type of these insulins soon to be commercially available in the United States are outlined.

Emergency use of insulin in the treatment of diabetes complicated by acute illnesses, surgery or trauma, and coma is briefly presented. The six-hour managment scheme used by Colwell [1] is preferred as the simplest and the most effective way of controlling complicated diabetes. Regular insulin is used alone at regularly spaced intervals unless the patient has already been using a longer acting insulin in which case both are used.

Diabetes can never be treated in a standard, routine mechanized fashion, and the patient's response to treatment must be the ultimate guide to the physician.

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## GALLSTONE OBSTRUCTION OF THE SMALL BOWEL

SAMUEL KARLIN, M. D.
W. CHARLES MILLER, M. D.
NEW ORLEANS

The treatment of acute cholecystitis has undergone a radical change in the past fifteen years. From an attitude of conservative expectancy, we have adopted the more aggressive approach with removal of the gallbladder during the early acute phase. Similarly, the apparent benignancy of the "silent" gallstone has failed to stand up under careful scrutiny, and more and more, cholecystectomies are being done for so-called silent gallstones. This aggressive attitude should result in a lowering of the morbidity and mortality associated with gallstone ileus, a fairly uncommon but relatively lethal disease.

Intestinal obstruction due to gallstones was first described by Bartholin in 1654, and during the past fifteen years, many excellent papers have appeared on the subject. Walters and Snell in 1940 and Hand and Gilmore in 1943 reported an incidence of 2 per cent and 1.7 per cent, respectively, of gallstone ileus in cases of intestinal obstruction.

The usual sequence of events is an attack of acute cholecystitis occurring in a patient with gallstones, and resulting in ulceration of a stone or stones through the gallbladder, or rarely the common duct, into some portion of the intestinal tract, usually the duodenum. At the time of ulceration, massive hemorrhage into the intestinal tract may occur, and make itself evident by the vomiting of blood and/or passage of blood from the rectum. Obstruction of the small bowel may occur at any point along the intestinal tract because of a disparity between the size of the stone and the lumen of the bowel or because of induced spasm of the bowel. However, the most frequent site of obstruction is in the vicinity of the ileocecal valve because of the progressive diminution in the caliber of the bowel from the duodenojejunal flexure to the ileocecal valve. Most stones will be passed via the rectum without a complicating obstruction.

TABLE 1

| Case No. | Age | Sex | Race | Admission Diagnosis | Duration Symptoms prior to Admission | Time from Admission to Operation | Operative Findings | Operative Procedure | Location of Stone | Prev. History G. B. Disease | Recent Acute Attack | Previous Jaundice | History of Bleeding | X-Ray Findings | Outcome | Autopsy or Subsequent Procedure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Touro R. B. 7/20/39–8/3 | 37 | F | W | Intestinal obstruction | 2 days | 1 day | 1 stone | Enterotomy | Lower ileum | 1 year | 1 year ago | No | No | | Well | |
| 2. Touro E. N. 5/11/40–5/26 | 45 | F | W | Intestinal obstruction | 5 days | 1 day | 1 stone | Enterotomy | Lower ileum | No | No | No | No | | Well | |
| 3. Touro H. K. 7/27/49–8/14 | 81 | F | W | Intestinal obstruction | 4 days | 1 day | 4 stones | Enterotomy | | 40 years | No | No | No | X | Well | |
| 4. Touro C. R. 2/15/50–2/26 | 77 | F | W | Intestinal obstruction | 2 days | 3 days | 1 stone | Enterotomy | Lower ileum | No | 5 months | No | No | X | Well | |
| 5. Touro L. H. 8/6/51–8/15 | 70 | F | W | Intestinal obstruction | 7 days | same day | 1 stone | Enterotomy | Ileum | No | 3 months | No | No | X | Well | |
| 6. Touro M. R. 2/2/51–2/4 | 76 | F | W | Intestinal obstruction | 7 days | same day | 1 stone | Enterotomy | Ileum | No | No | No | No | | Died | Myocardial infarction |
| 7. Touro M. T. 10/28/43–11/24 | 52 | F | W | Intestinal obstruction | Several days | 2 days | 1 stone | Enterotomy | Ileum | Yes | 4 months | No | No | X | Well | |
| 8. Touro LSL 10/24/46–11/21 | 52 | F | W | Intestinal obstruction | 12 hours | same day | 1 stone | Enterotomy | Ileum | 4 years | No | No | No | | Well | |
| 9. Touro E. L. 7/25/51–8/3 | 62 | F | W | Intestinal obstruction | 5 days | same day | 1 stone | Enterotomy | Ileum | Yes | No | No | No | X | Well | |
| 10. Charity C. G. 9/23/50–10/13 | 83 | F | W | Intestinal obstruction (large bowel due to ca.) | 7 days | 1 day | 1 stone | Enterotomy | Upper ileum | Stone seen in gall bladder 7 months ago | 7 months ago | 7 months ago | No | | Well | |
| 11. Charity MPC 12/21/51–1/3/52 | 78 | F | W | Intestinal obstruction | 1 month | 2 days | 1 stone | Enterotomy | Upper ileum | 4 months | 11/9/51 1 month | No | 10/20/51 vomited blood tarry stools | | Well | |
| 12. Charity P. W. 11/12/48–1/12/49 | 61 | F | C | Partial intestinal obstruction | 3 weeks | 17 days | 2 stones | Enterotomy and Gastrotomy | Jejunum and Stomach | No | No | No | No | X | Well | |
| 13. Charity MDJ 11/2/52–11/16 | 75 | F | W | Intestinal obstruction | 6 days | Same day | 1 stone | Enterotomy | Terminal ileum | 6 or 7 years | No | No | No | | Died | Ca. of gall bladder with widespread carcinomatosis |
| 14. Charity S. C. 3/6/43–3/6 | 71 | F | C | Intestinal obstruction | 6 days | Same day | 1 stone | Enterotomy | Terminal ileum | No | No | No | No | | Died | Perforation at junction of duodenum and jejunum |
| 15. Charity O. H. 5/3/51–5/11 | 56 | F | C | Intestinal obstruction | 2 days | Same day | 1 stone | Enterotomy | Jejunum | 1 year | No | No | No | | Well | 9/10/53–operation Shrunken G.B. removed. No stones |
| 16. Sara Mayo H.W. 11/18/52–11/26 | 45 | F | W | Intestinal obstruction (Gall stone ileus) | 7 days | Same day | 1 stone | Enterotomy | Mid-Jejunum | 6 months (Radio opaque stone in G. B.) | 6 months | No | No | X | Well | |
| 17. Sara Mayo G.B. 11/29/52–12/14 | 61 | F | W | Intestinal obstruction (Gall stone ileus) | 2 days | Same day | 1 stone | Enterotomy | Mid-Jejunum | No | No | No | No | X | Well | |

Wakefield, Vickers and Walters in a study of 152 cases of spontaneous cholecystenteric fistulas at the Mayo Clinic found about a 10 per cent incidence of gallstone ileus.

Obstruction of the small bowel from gallstones usually occurs in obese females past the age of sixty who present the triad of signs and symptoms associated with intestinal obstruction, viz., colicky pain, vomiting and obstipation. Once the x-ray evidence of intestinal obstruction is established, the need for surgery is imperative after a short preoperative interval for decompression, hydration, and the restoration of electrolyte balance. Differentiation between the intestinal obstruction from other causes and that from gallstone can be made with certainty only if: (1) Air or barium is demonstrated in the biliary tract. (2) A stone is visualized in the bowel. Or (3) A stone in the gallbladder region is no longer present there and is seen elsewhere in the abdominal cavity.

We have reviewed all the cases of gallstone ileus which have occurred during the past fifteen years in three New Orleans hospitals, Charity Hospital, Touro Infirmary and Sara Mayo Hospital, and the data are shown in Table 1.

Walter Becker reviewed 1007 cases of acute mechanical obstruction occurring at Charity Hospital in the ten year period 1940 through 1949. (Table 2)

TABLE 2
CHARITY HOSPITAL 1940-1950 (BECKER) [12]

| | |
|---|---|
| 1007 cases | —acute mechanical intestinal obstruction |
| 412 cases | —due to adhesions |
| 305 cases | —due to hernias |
| 102 cases | —due to primary neoplasms |
| 74 cases | —due to intussusception |
| 57 cases | —due to volvulus |
| 14 cases | —due to congenital malformations |
| 14 cases | —due to obturator obstruction |
| 10 cases | —carcinomatosis |
| 5 cases | —Mesenteric thrombosis |
| 5 cases | —Diverticulitis |
| 5 cases | —Unknown |
| 3 cases | —Extrinsic mass |
| 1 case | —Meckel's |

In breaking down the 14 cases of obturator obstruction referred to in Table 2, we found that only one of these (our Case No. 14) was due to gallstones. The others were cases of ascariasis or phytobezoars.

As can be noted in Table 1, positive x-ray findings were present in eight of the seventeen cases of gallstone ileus. (Table 3)

TABLE 3
X-RAY FINDINGS

| | | |
|---|---|---|
| Case 3. | 1. | Possible gallstone in LLQ |
| | 2. | Air in biliary tract |
| Case 4. | 1. | Gallstone in RUQ five months ago |
| | 2. | Gallstone now in RLQ |
| | 3. | Gallstone in lumen of bowel |
| | 4. | Air in biliary tract |
| | 5. | Small bowel obstruction |
| Case 5. | 1. | Calcified mass in pelvis |
| | 2. | Questionable air in biliary tract |
| | 3. | Small bowel obstruction |
| Case 7. | 1. | Biliary fistula |
| | 2. | Indirect evidence of stone |
| | 3. | Small bowel obstruction |
| Case 9. | 1. | Radio opaque gallstone in gall bladder |
| | 2. | Radio opaque gallstone in small bowel |
| | 3. | Air in gallbladder |
| | 4. | Small bowel obstruction |
| Case 12. | 1. | Barium in Miller-Abbott tube stopped at midjejunum |
| Case 16. | 1. | Gallstone, radio opaque, seen in gallbladder six months ago, now absent. |
| | 2. | Gallstone in bowel, left midabdomen |
| | 3. | Air in biliary tract |
| | 4. | Small bowel obstruction |
| Case 17. | 1. | Air in biliary tract |
| | 2. | Small bowel obstruction |

The ages ranged from 37 to 83, with only three cases occurring in patients below the age of fifty. All were women. Three died. One was a seventy-six year old woman who had symptoms of intestinal obstruction for seven days prior to admission, and who died two days postoperatively of myocardial infarction. Another was a seventy-five year old white female who had had a known history of gallbladder disease for six or seven years, symptoms of intestinal obstruction six days prior to admission and surgery, and who exhibited wide-spread carcinomatosis (of gallbladder) at the time of operation, in addition to obstruction of the terminal ileum by a gallstone within the lumen. The third case was a seventy-one year old colored female with no previous his-

tory of gallbladder disease, but with symptoms of intestinal obstruction for six days prior to admission and surgery, and who was found at operation to have a perforation at the duodenojejunal flexure as well as an obstructing gallstone in the terminal ileum.

It is of interest to note that in all of the cases of proven gallstone ileus, the region of the gallbladder was poorly visualized at operation because of induration and adhesions. In no case was any attempt made to expose or deal with the cholecystenteric fistula at the original operation, and in only one case (Case No. 15) was it deemed necessary to re-explore the patient at a subsequent date. This was in a fifty-six year old colored female who continued to complain of fatty food intolerance, vague pains and soreness in the right upper quadrant. A second operation, performed two and one-half years after the initial enterotomy, revealed a mere nubbin of gallbladder to be present (with no stones) and with a fistulous opening present between the remnant of gallbladder and duodenum. The small portion of gallbladder was removed and the fistula into the duodenum closed. In retrospect, this was probably an unnecessary operation, and the benefit to the patient is still to be proved.

One patient, a seventy-eight year old white female, had been admitted three months before because of pain in the epigastrium and vomiting of three months duration. A diagnosis of multiple diverticulosis (large bowel) and hiatus hernia was made at this time. She was readmitted one month later with a history of vomiting blood and passing tarry stools. Additional diagnoses of nonfunctioning gallbladder, possible esophageal varices and hematemesis, cause undetermined, were made at this time. Two weeks after discharge, she was readmitted and operation revealed a gallstone in the upper ileum (flat plate was negative for stone) while exploration of the gallbladder region was indefinite.

Many of these cases demonstrated partial intestinal obstruction over a period of days or weeks which progressed to complete obstruction before surgical exploration was thought imperative. Had the possibility of gallstone ileus been entertained and a careful correlation of the patient's history made with the x-ray findings, the correct diagnosis might have been made earlier. The criteria for x-ray diagnosis are well known and consist of the following:

1. Presence of small bowel obstruction
2. Presence of air or barium in the biliary tract
3. Absence of a gallstone from its previously demonstrated position in the gallbladder.
4. Presence in the intestinal tract of a gallstone, as evidenced directly by its opacity, or indirectly with the aid of contrast media.

These findings are well demonstrated by the accompanying x-ray pictures, (Figure 1) taken in Case No. 4.

In dealing with radio opaque gallstones,

Figure 1. The arrow to the right of the vertebral column and above the tube points to air in the biliary tract. The arrow beneath the left end of the transverse colon points to a gallstone in the small bowel.

Figure 2. Radiopaque stone.

Figure 3. Stone removed from body and x-rayed. Dense central core is only part visualized when patient is x-rayed.

it would not be amiss to comment that only the central radio opaque portion is visualized directly on x-ray. This is illustrated in Figure 3.

In our opinion, the procedure of choice is a simple longitudinal enterotomy performed just proximal to the stone after the bowel contents have been milked proximally and the bowel lumen occluded with a rubber shod clamp. The bowel is closed transversely. A search should be made for other stones, since occasionally there are multiple calculi, especially if the original stone is facetted. No attempt should be made to deal with the cholecystenteric fistula at this time. It would appear from these and other reported cases that subsequent surgical intervention with the idea of removing the gallbladder and eliminating the fistula is rarely justified.

## CONCLUSION

1. Awareness of the possibility of gallstone ileus in patients with small bowel obstruction will lead to earlier, more exact diagnoses.

2. Aggressive treatment of early acute cholecystitis and of silent gallstones should further reduce the incidence of gallstone ileus.

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# TEACHING MODERN RHINOLOGY *

RALPH H. RIGGS, M. D.
SHREVEPORT, LOUISIANA

During the past few years articles have appeared in the literature concerning otolaryngologic teaching and the future of this specialty. Practically all of the discussion has dealt with otology, laryngology, or broncho-esophagology. Rhinology is barely mentioned. There are reasons for this.

Until the early 1940's rhinological surgery consisted of the submucous resection, removal of polyps, and various degrees of sinus surgery.

During the past decade the complete septum operation, its reconstruction, and surgery of the external nasal pyramid has been added.

Up until this time practically all of the surgery performed on the external nose was on an anatomical basis. The conscientious rhinologist, who was interested and had enough money to obtain some of these procedures, soon found out that many of his patients were not getting a good functional result, so he abandoned this surgery. In fact, many of our specialty practically discontinued the septum operation. Actually dissatisfaction was so general that the public and many of the medical profession looked upon any nose operation with great disfavor.

There is now a renewed interest in this subject because of the newer concepts of nasal physiology so vividly described by Dr. M. H. Cottle.

Another reason why so little has been said about the teaching of modern rhinology, is that we have not had enough qualified teachers.

The answer to this is to instruct those individuals who are in teaching positions. Generally, this is the idea followed by Dr. Cottle. As of this date, he has given instruction to over sixty professors in twenty-five medical schools, including eleven heads of departments. Of course, there are many others. It is Dr. Cottle's opinion that this work cannot be learned in a one week, one month, or a six months course. Regardless of who you are, I dare say, it will take a minimum of five years of hard work, with frequent interchanging of ideas, detailed records, self discipline (including self analysis) and observation of many patients pre and post operative, before one can do this work with much satisfaction.

How is such a teaching program carried on? I shall briefly outline the one used by Dr. Cottle. In the past several years he has given his course twice a year—once in Chicago at the Illinois Masonic Hospital and once at another city. So far, it has been given in Salt Lake City, Shreveport, Denver, Colorado Springs, Hartford, Indianapolis (University of Indiana) and at Washington University in St. Louis. Besides this, there have been abbreviated instruction periods in Pittsburg, Rye, (New York), and recently at Yale University. This year it will be given at Johns Hopkins and next year at the University of Oregon Medical School, Portland, Oregon.

A few new students are invited to each course; along with them are others who have had the instruction before, from one, to as many as ten or more times. After two or three years, or four to six courses, one may become an instructor. It is the instructor's job to become a teacher and to help in the mechanics of the course. All instructors are requested to bring exhibits to each course. These show evidence of much work and study. Such an exhibition as seen at the last course in Chicago has never been equaled at any of the "big name" meetings.

The course is titled: INTRODUCTION TO FUNDAMENTALS OF RECONSTRUCTIVE SURGERY OF NASAL SEPTUM AND EXTERNAL NASAL PYRAMID. It consumes over one hundred hours in eight days, with another day optional. The class is divided into groups of 8-10. The last class having 6

* Presidential address before the Louisiana-Mississippi Ophthalmological and Otolaryngological Society, Edgewater Park, Mississippi, April 9-11, 1954.

groups—with each group 2 or 3 instructors are assigned.

It consists of: *Didactic Lectures:* (all groups). These are given by Dr. Cottle and include anatomy, physiology, operative procedures, and philosophy. Lantern slides, motion pictures and drawings are generally used.

*Medical Seminar:* (one group). These are given by past students (instructors). Material consists of reviewing the didactic lectures with a question and answer period.

*Surgical Seminar:* (one group). These are given by instructors. Material consists of setting up the operating room, preparation of patient, dressing, anesthesia, and a review of the use and care of instruments.

*Observing Surgery:* (four groups, Dr. Cottle operating; one group, instructors operating). Each two new observers are assigned a seat next to an instructor who keeps them oriented and sees that they get a good detailed record of the operation.

*Assisting Surgery:* Two new students assist Dr. Cottle and two second or third year students assist in Surgery #2, where one of the instructors is operating. These students are given the privilege of performing some of the procedures.

*Observation of Patients:* This includes seeing the patients the day before surgery, the day of surgery, the day after surgery, making rounds, the first dressing, and seeing many patients operated from one day to many years; also patients who have been re-operated. One has the experience of examining these patients and questioning them.

*Cadaver Surgery:* Two doctors work on each specimen, one new student along with one who has had the course previously. An instructor is assigned to each four men and he rotates each session so that there will be a better exchange of ideas. The cadaver surgery consists of operative procedures taught in the didactic lectures, medical seminars and at surgery. Each student gets to perform all procedures taught. I want to state here that no procedure is done unless a good reason can be given for its use.

*Picture Analysis:* Each day three operations are performed and the students receive four photographs of each patient. They are taught how to analyze these pictures and to correlate them with the surgery. They are also taught how to take photographs and are encouraged to take them personally.

*Keeping Records:* Each student is given a note book in which he keeps his pictures and notes. He is urged to keep detailed notes. At the end of the course Dr. Cottle goes over this book with him and gives his impression of the student's particular needs. For Dr. Cottle this is an all day experience.

During the course there is an official scribe who sees that an official record is kept of *all* happenings of the day.

A course such as this is an experience that one will never forget. After attending it for several times you become a part of it and it becomes a part of you. All agree that this cannot be done by one individual. This is made possible by the men Dr. Cottle has taught, and who, much like the disciples of Freud, have become a part of him.

Certainly, when more men have been trained in modern rhinological surgery (which really means "the preservation and restoration of nasal function") more references will be made to it in the literature.

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## DIFFERENTIATION OF CARDIAC AND NON-CARDIAC CHEST PAIN

The necessity for the evaluation of chest pain presents itself to every physician. In recent years, because of the lengthening life span and because of our broadening knowledge of coronary disease, the need for differentiation of cardiac and non-cardiac chest pain has increased. The patient with a suggestive history and a negative resting electrocardiogram may or may not have heart disease. The physician must interpret symptoms in order to render adequate advice. In certain complicated situations heart disease may exist but chest pain may come from functional or other organic disease.

In a recent paper by Master, Jaffe, and Pordy,[1] a valuable statistical study of "diagnostic criteria" was presented which will assist the physician materially in this problem. A study was made of the histories of 200 consecutive private patients complaining of chest pain. Half of these had coronary disease with an abnormal resting electrocardiogram. The other half were considered free of heart disease because of a normal resting electrocardiogram and a negative double "two-step" test, and also, because none of these latter patients developed a coronary insufficiency or occlusion during a four year period of observation. Eighty of the non-cardiac cases suffered from some functional disturbance. In the majority, the diagnosis was neurosis, and the remainder, neurocirculatory asthenia, uncomplicated hypertension or hypotension, or paroxysmal arrhythmia. The remaining 20 patients were found to have arthritis, gallbladder disease, peptic ulcer, or hiatus hernia.

The chest pain was considered as to onset, location, type, radiation, duration, and relief by nitroglycerin. Many cases of anginal and functional pain were found to be atypical. Many cardiac patients did not exhibit any of the characteristic pain patterns. On the other hand, patients in the group having functional pain were found to have pain substernal in location, onset with effort, and relief by nitroglycerin. Chest pain has usually been regarded as cardiac in origin if "(1) it was induced by effort, (2) its location was substernal, (3) it was constricting or oppressive in type, (4) it radiated into the left shoulder or arm, (5) it was of short duration, (6) it was relieved by nitro glycerin." Non-cardiac chest pain has usually been considered as existing if "(1) it occurred at rest, (2) its location was in the left chest, (3) it was aching in quali-

1 Master, Arthur M., Jaffe, Harry L., and Pordy, Leon: Cardiac and non-cardiac chest pain: A statistical study of "diagnostic" criteria, Ann. Int. Med. 41:315 (Aug.) 1954.

ty, (4) it did not radiate, (5) it was of long duration, and (6) it was not relieved by nitroglycerin."

Master found exceptions to the pathognomicity of the six criteria ranged from 15 to 40 per cent. For instance, in 30 patients with coronary disease the pain was precordial, while in 23 patients with functional pain it was substernal. Anginal pain on effort appeared in only 90 per cent, and may have been induced only by some very specific exertion. In 23 patients, walking did not evoke the anginal syndrome. In 31, it occurred at rest as well as on effort and was not relieved by nitroglycerin in 10 to 15 per cent. On the other hand, 34 per cent of the functional patients developed pain on effort, and in only 25 per cent of these was it induced by emotion. In these functional patients, nitroglycerin relieved the pain in more than 10 of the 27 who employed it repeatedly.

Consideration of the facts presented in this investigation shows that the physician cannot rely on any one, or even three of the criteria of chest pain usually regarded as diagnostic for angina. The mistaken interpretation of a pain as anginal in a patient who actually has functional pain is a serious matter. A cardiac neurosis established by such an error could be relieved only with great difficulty. Aside from the cardiac neuroses, chest pain may be due to such organic conditions as spondylitis, arthritis, neuritis, fibrositis or myositis, hiatus hernia, gallbladder disease, peptic ulcer, chronic lung disease, and pulmonary hypertension.

With due caution and in consideration of the criteria given above, a proper diagnosis can usually be made. When doubt exists, it should be expressed, and further reliance placed on the performance of the Master's double two-step test, and on adequate long continued observation. By such means, physicians may, on the one hand, reduce the number of instances of iatrogenic heart disorder, and the number of cases of heart disease not properly diagnosed on the other.

## CAUTION ON AN AGENT REPORTEDLY USED FOR THE TREATMENT OF CANCER

Many physicians in Louisiana recently received a publication entitled *Report on Krebiozen an Agent for the Treatment of Cancer* by the Krebiozen Research Foundation. According to a statement in the publication, Krebiozen is a compound extracted from the blood serum of horses which have been previously injected with a preparation made from a culture of a "mold" called *Actinomyces bovis.*

In this day of surprising developments in the field of specific therapy, statements in this publication may attract the interest of even a skeptical physician. For this reason, it is thought well in the interest of caution to give certain facts in regard to this substance.

For the past three years, the controversy has been raging on this substance and has not been confined to scientific circles. Certain phases have been fought through the courts of Illinois and ultimately attained the prominence of a legislative commission consisting of seven members from each House of the Illinois legislature. Five publications have appeared in the Journal of the American Medical Association during the three years.[2-6] A Committee was appointed by President George D. Stoddard, former president of the University of Illinois, which was headed by Dr. Warren H. Cole, Professor of Surgery, University of Illinois. This "Research Validation Committee" rendered a valuable report which was submitted to the Board of Trustees of the

2 Status Report on Krebiozen. (Report from the Committee on Research of the Council on Pharmacy and Chemistry). J. A. M. A. 147:864 (Oct. 27) 1951.

3 The Committee's opinion over the signature of Dr. Winternitz was published under Correspondence in J.A.M.A. 147:1297 (Nov. 24) 1951.

4 Schmitz, Herbert E., and Smith, Charles J.: Primary treatment of cervical carcinoma with "Krebiozen", J.A.M.A. 148:843 (March 8) 1952.

5 Szujweski, Henry A.: Therapy of cancer. Comparison with other therapy as determined by enzyme analysis, J.A.M.A. 148:929 (March 15) 1952.

6 Loefer, John B., PhD.: Ineffectiveness of "Krebiozen" therapy on transplanted mouse leukemia and lymphosarcoma, J.A.M.A. 149:298 (May 17) 1952. (Experimental on mice)

University of Illinois, on November 23, 1952. Pertinent abstracts from the summarized committee findings are as follows:

Krebiozen has not been identified chemically but is available only in paraffin oil suspension. Hence, it is not available for laboratory experimentation and the accounts of its preparation are open to important questions that have not been answered.

Ignorance of the nature of the material interferes with a sound evaluation of its therapeutic effectiveness.

There was found no acceptable evidence that any malignant tumor had been cured by Krebiozen; none was claimed in Dr. Ivy's report.

There was found no evidence of prolongation of life through the use of Krebiozen; no such claim was made in Dr. Ivy's report.

There was no histological evidence that Krebiozen produced degenerative or regressive changes in tumor cells; no such unequivocal effect was claimed in Dr. Ivy's report. (One research physician interpreted certain changes as degenerative but this was not concurred in by the member of the Cole Committee who examined these histological observations.)

There was found no radiographic evidence that Krebiozen could reduce metastatic tumor lesions in bones or lungs; there was no claim to this effect in Dr. Ivy's report.

It is evident from the above "Krebiozen has no curative value in the treatment of cancer." When an additional valuable therapeutic agent is developed in the field of cancer, it will not have to be supported by courts and legislative commissions for its acceptance.

—o—

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**The Executive Committee dedicates this section to the members of the Louisiana State Medical Society, feeling that a proper discussion of salient issues will contribute to the understanding and fortification of our Society.**

***An informed profession should be a wise one.***

### 1954 - 1955
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Paul D. Abramson, M. D., Chairman, Shreveport; Jared Y. Garber, M. D., Lake Charles; W. Robyn Hardy, M. D., New Orleans; Luke Marcello, M. D., DeRidder.

LIAISON WITH LOUISIANA STATE NURSES' ASSOCIATION

Rodney G. Masterson, M. D., Chairman, Alexandria; F. F. Boyce, M. D.; E. L. Leckert, M. D.; both of New Orleans; Moss M. Bannerman, M. D., Baton Rouge; George Wright, M. D., Monroe.

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NEUROPSYCHIATRIC SERVICE AT CHARITY HOSPITALS

Edmund Connely, M. D., Chairman; P. H. Jones, M. D.; both of New Orleans; E. M. Robards, M. D., Jackson; Arthur L. Seale, M. D., Pineville.

NOMINATION OF COMMITTEES TO BE ELECTED AT 1955 ANNUAL MEETING
(To be appointed)

PUBLIC HEALTH OF THE STATE OF LOUISIANA

B. J. DeLaureal, M. D., Chairman; W. P. Gardiner, M. D.; both of New Orleans; E. C. Faulk, M. D., Rayne; F. P. Rizzo, M. D., Monroe; J. R. Romero, M. D., Welsh; J. J. Stagg, M. D., Eunice; G. Vasquez, M. D., Lake Charles; J. A. White, Jr., M. D., Alexandria.

PUBLIC RELATIONS COUNCIL

Walter Moss, M. D., Chairman, Lake Charles; Clarence E. Boyd, M. D., Shreveport; C. Grenes Cole, M. D.; W. Robyn Hardy, M. D.; both of New Orleans.

RURAL AND URBAN HEALTH

J. P. Sanders, M. D., Chairman, Shreveport; E. R. Guidry, M. D.; George H. Hauser, M. D.; both of New Orleans; Guy R. Jones, M. D., Lockport; W. Rigsby Hargrove, M. D., Oakdale; O. B. Owens, M. D., Alexandria; M. C. Wiginton, M. D., Hammond; C. T. Yancey, M. D., Monroe.

SECOND DISTRICT MEDICAL SOCIETY AND ORLEANS PARISH MEDICAL SOCIETY
(Investigation in re membership)

E. L. Leckert, M. D., Chairman; A. B. Cairns, M. D.; A. V. Friedrichs, M. D.; all of New Orleans; M. B. Casteix, M. D., Kenner.

STATE HOSPITAL POLICIES

George Wright, M. D., Chairman, Monroe; Wm. E. Barker, Jr., M. D., Plaquemine; L. O. Clark, M. D., Lafayette; P. H. Jones, M. D.; Charles B. Odom, M. D.; Edwin L. Zander, M. D.; all of New Orleans; F. J. MacPherson, M. D., Shreveport.

WOMAN'S AUXILIARY
(Advisory Committee)

M. C. Wiginton, M. D., Chairman, Hammond; C. Grenes Cole, M. D., New Orleans; Walter Moss, M. D., Lake Charles.

## HEALTH COUNCIL MEETING

The Annual Meeting of the Louisiana Health Council will be held in Monroe on the 11th and 12th of November. Do not forget these dates. Sixteen or more organizations dealing with the promotion of health, health education and related subjects will be represented and we are sure you will be well compensated for your trip to Monroe.

Dr. H. E. Slusher, President, Missouri Farm Bureau Federation and a member of the National Council on Rural Health, and Mr. Aubrey D. Gates, well-known recognized authority and leader in this work, from the American Medical Association, will give addresses and we feel confident that they will bring messages which will be most worth while and informative.

More of our members should become members of this Health Council and join us in our fight to improve the health conditions of our school children and create a closer relationship with the respective groups which are sponsoring these projects, thereby achieving for our people better conditions of health and education which are so essential and contribute so much to the health and happiness of our people. This work should be directed by doctors who are better qualified and informed on health matters and should take the lead in this work. The public looks to us for leadership in all things medical, and we should not be found delinquent but should join our forces with other groups working in this field to make our State the envy of other States and to show to the people that the destiny of their children's health is always in good hands when entrusted to the doctors of this State.

Won't you please apply for membership in the Louisiana Health Council and keep our profession at the top of the list in this meritorious work?

## PUBLIC RELATIONS MEETING

A meeting sponsored by the Department of Public Relations of the American Medical Association was held in Chicago September 1 and was attended by some 250 representatives from various states. It has come to the point, however, where a doctor of medicine is quite a rarity at these meetings as it seems to be the trend for this field of medicine to be taken over by full-time public relations men.

The great thing now in publicity is television and those present were shown several films which might be obtained if any of the TV stations in specific areas are interested.

It was reported at this meeting that the MARCH OF MEDICINE will be continued through 1955 and that the Dow Chemical Company is coming out with a new series of TV pictures which has to do with the practice of medicine.

It was strongly urged that each county society devote one meeting each year to public relations as it is thought that a new member properly indoctrinated will make a much more valuable member than if he is uninformed. This is done by having a meeting with the new members twice a year and having the sponsor of the new member present him to the membership and the new member presented with a folder containing material concerning the society activities and a personal letter of welcome.

There has been a new idea brought forward in the tape recordings of various health subjects and these are forwarded to the various high schools. It might be well to look into this with regard to future activity of the Council on Medical Service and Public Relations of our State Society.

The next point taken up was how to get doctors to medical meetings. It has been found that the larger the society, the poorer the attendance. The programs are usually bad and a business meeting in conjunction with a scientific program usually holds the attendance down. It is found that the

best way to get the doctors out to a meeting is adequate notification of the meeting, having a central meeting place where the doctors can park their cars. If a meeting is held concurrently with a meeting of the Woman's Auxiliary, the attendance at the medical society meeting will increase notably and the best attendance is noted when there is food and a social hour after the meeting.

Another idea presented was the offering of a prize to the newspaper reporter who writes the best health article during the year 1955.

W. ROBYN HARDY, M. D., Chairman
Council on Medical Service and Public Relations

# MEDICAL NEWS SECTION

## CALENDAR

### PARISH AND DISTRICT MEDICAL SOCIETY MEETINGS

| Society | Date | Place |
|---|---|---|
| Calcasieu | Fourth Tuesday every other month | Lake Charles |
| East Baton Rouge | Second Tuesday of every month | Baton Rouge |
| Morehouse | Third Thursday of every month | Bastrop |
| Natchitoches | Second Tuesday of every month | |
| Orleans | Second Monday of every month | New Orleans |
| Ouachita | First Thursday of every month | Monroe |
| Rapides | First Monday of every month | Alexandria |
| Sabine | First Wednesday of every month | |
| Second District | Third Thursday of every month | |
| Shreveport | First Tuesday of every month | Shreveport |
| Vernon | First Thursday of every month | |

### L. S. U. MEDICAL EXPERT TO MAKE FAR EAST TOUR

Dr. Robert A. Matthews, head of the department of neuropsychiatry at the Louisiana State University School of Medicine, will participate in a 30-day tour of the Far East as a consultant to the Surgeon General of the Army.

The tour will take him to military installations in Japan and Korea primarily. He will make an inspection of the Army's medical facilities, make staff evaluations and study the efficiency of the psychiatric service available at the installations. Dr. Matthews made a similar tour of the medical facilities in 17 German cities last year.

The LSU professor will also give a number of lectures in neuropsychiatry, will conduct teaching seminars and will serve as a consultant in problem cases as a service to the Army's medical experts.

Dr. Matthews will leave the United States October 5 for Tokyo. The tour has been arranged to permit Dr. Matthews to assist and advise the Theater Surgeon and the hospital staffs to assure that patients are receiving the best medical care available.

### 48TH ANNUAL MEETING SOUTHERN MEDICAL ASSOCIATION

The 48th annual meeting of the Southern Medical Association will be held November 8, 9, 10, 11 in Saint Louis. The meeting begins with a general public session on Monday forenoon and between that time and Thursday noon, forty-eight half-day sessions will be held. The Association has met in Saint Louis four times previously and the president of the Southern Medical Association, Dr. Alphonse McMahon, heads the meeting in his own home town. The local committees have been active in their preparation for a welcome to this complete general medical meeting for which there is *no registration fee*, and St. Louis itself has many claims to fame in medicine.

Hotel accommodations are available and requests for room reservations should be sent to the Housing Bureau, Southern Medical Association, 911 Locust Street, Room 406, St. Louis 1, Mo.

### NEW ORLEANS GRADUATE MEDICAL ASSEMBLY announces the 1955 POSTCLINICAL TOUR TO EUROPE

Following the 18th annual meeting of The New Orleans Graduate Medical Assembly, March 7-10, the group will leave New York on March 12 by Pan American World Airways "PRESIDENT SPECIAL" for Europe. The Postclinical Tour Committee has been most active and enthusiastic in rounding out a full program of entertainment, sight-seeing and arranging medical programs in Paris, Rome, Munich, Copenhagen, Stockholm and London.

The schedule is as follows: March 12—afternoon departure from New York arriving in *Paris* on March 13; March 17—*Rome* by morning flight from Paris; March 20 — *Florence* by afternoon train from Rome; March 22—*Venice* by afternoon train from Florence; March 25—*Munich*—arrive by train in the morning; March 27—*Copenhagen* by afternoon flight, via Frankfort; March 31—*Stockholm* by afternoon flight; April 3—*London*

by morning flight.

Departure may be made on April 7 from London by Pan American World Airways, arriving New York April 8, or, sail from Southampton on French Line S. S. LIBERTE, arriving New York April 13.

For further information and rates write Secretary, The New Orleans Graduate Medical Assembly, Room 103, 1430 Tulane Avenue, New Orleans 12, Louisiana.

### "ATHLETIC HEART" THEORY QUESTIONED

The term "athletic heart" should be scrapped because it is used with too many different meanings to describe a condition that "probably does not exist," an editorial in a recent (July 17) Journal of the American Medical Association said.

It said the many reports on the effect of exercise on the heart lead only to the conclusions that "infections are more important as a cause of cardiac disease than exercise, that exercise even when strenuous will not damage a normal heart, and that persons with a heavy body build have a lower life expectancy than those with a lighter build regardless of the type or extent of their participation in sports."

However, there can be "no doubt" that strenuous exercise may injure a heart that is already weakened, and young athletes should have close medical supervision, the editorial added.

## BOOK REVIEWS

*The Anatomy of the Nervous System: Its Development and Function;* by S. W. Ranson and S. L. Clark, Ninth Edition, Philadelphia,W. B. Saunders Co., 1953, pp 581, figs. 434. Price $8.50.

The latest edition of this fine textbook continues the tradition which has made it justly famous throughout the past three decades. The first seven editions were published under the sole authorship of Dr. Ranson; this is the second edition appearing since his death, with Dr. Clark entirely responsible for the revision. The revision has not allowed the force of tradition to prevent incorporation of changes needed to keep the presentation abreast of the times. As in the past, this book presents a firm foundation of the structural makeup of the central and peripheral nervous systems, and a brief but adequate description of their developmental history. Using these facts as building blocks, the functional basis of neuroanatomy is then considered in considerable detail. It is particularly in this latter feature that progress has been made in neuroanatomy in recent years, and Dr. Clark has made full use of the newer information in this field. A very successful effort is made at integration of structural and functional phases of the problem in such a manner that the emphasis is still centered on the anatomical concept of the nervous system as a whole.

Generous use is made in this edition of information derived from the fields of experimental and clinical neuroanatomy, but this material is not allowed to obscure the basic structural plan of presentation. It is used, rather, to augment and to clarify the anatomical concept and to present it as a living and working mechanism rather than as a static dissertation on details of structural parts.

This edition reflects several features of changing emphasis in the basic study of neuroanatomy. Two of these features might be mentioned: the facilitatory and inhibitory mechanisms centered in the brainstem, and the specific functions of the cerebellum. These changes, however, have been fitted into the chapter plan so that they disturb in no way the continuity or proportion of the book as a whole.

If this book merits any adverse criticism, it is the rather light treatment of the nervous pathways. The fundamentals of pathways and their relations are adequately presented in almost every case, but the detailed consideration is frequently lacking. These details are oftentimes not of primary importance of themselves, but they are frequently used with great profit in such courses as Neurophysiology and Clinical Neurology, which typically follow Neuroanatomy in the medical curriculum. It might be thus said that in this respect, the book is not fully adequate in bridging the gap between preclinical and clinical aspects of neurology.

RALPH N. BAILLIF, PH.D.

### PUBLICATIONS RECEIVED

Grune & Stratton, Inc., N. Y.: The Digital Circulation, by Milton Mendlowitz, M. D.

Harvard University Press, Cambridge: Psychomotor Aspects of Mental Disease, by H. E. King, Ph.D.

Lea & Febiger, Phila.: Anatomy of the Human Body, by Henry Gray, F.R.S., edited by Charles Mayo Goss, M. D. (26th edit.).

The C. V. Mosby Co., St. Louis: Practice of Allergy, by Warren T. Vaughan, M. D., and revised by J. Harvey Black, M. D. (3rd edit.).

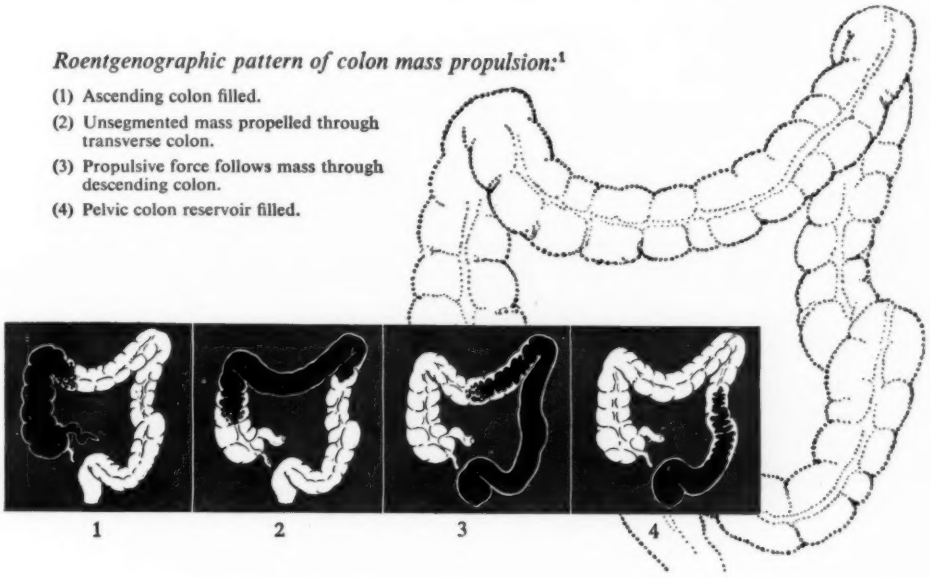
Philosophical Library, N. Y.: The Concept of Schizophrenia, by W. F. McAuley, M. D.

W. B. Saunders Co., Phila.: The Surgical Clinics of North America, by 27 contributors; Textbook of Pediatrics, edited by Waldo E. Nelson, M. D. (6th edit.).

University of Florida Press, Gainesville: Planning Florida's Health Leadership, a Summary by Russell S. Poor, Ph.D.

*Roentgenographic pattern of colon mass propulsion:*[1]

(1) Ascending colon filled.
(2) Unsegmented mass propelled through transverse colon.
(3) Propulsive force follows mass through descending colon.
(4) Pelvic colon reservoir filled.

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Such gentle stimulation is of distinct advantage in reeducating and reestablishing those reflexes which control bowel evacuation. Many factors may pervert the normal reflexes, causing finally chronic constipation. Among them are: nervous fatigue and tension, improper intake of fluid, improper dietary habits, failure to respond to the call to stool, lack of physical exercise and abuse of the intestinal tract through excessive use of laxatives.[2]

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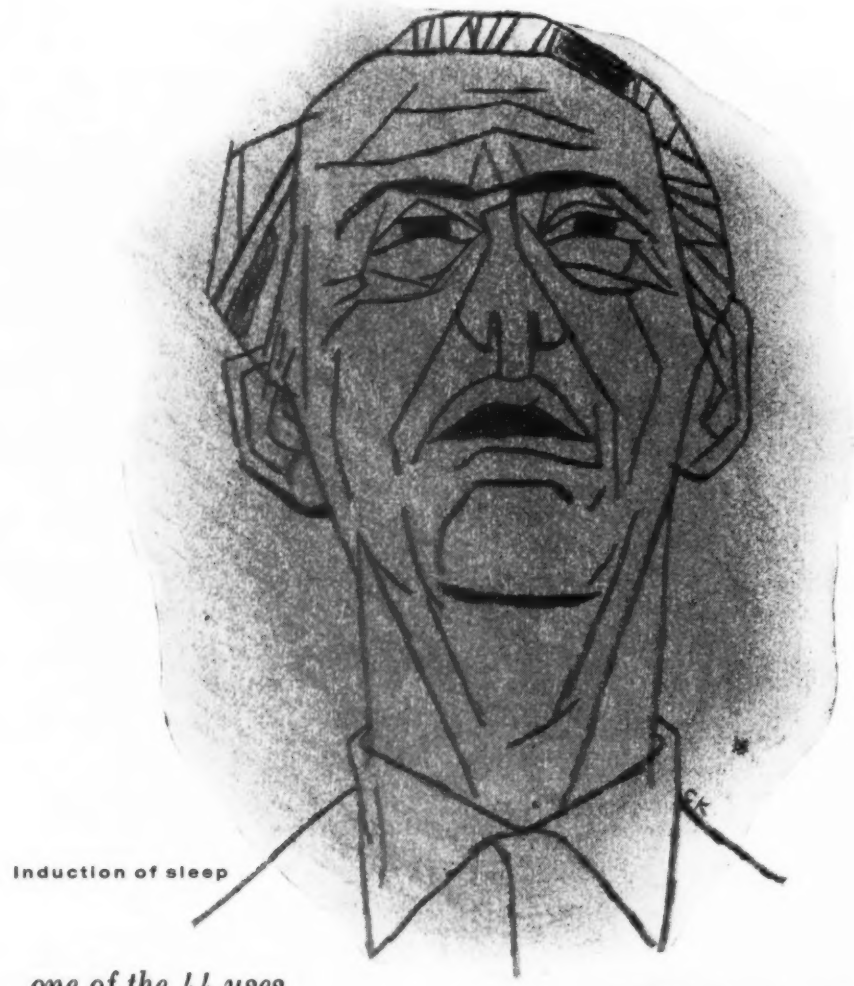
1. Best, C. H., and Taylor, N. B.: The Physiological Basis of Medical Practice: A Text in Applied Physiology, ed. 5, Baltimore, The Williams & Wilkins Company, 1950, pp. 579-583.

2. Bargen, J. A.: A Method of Improving Function of the Bowel, Gastroenterology *13*:275 (Oct.) 1949.

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*Influence of Wine on Appetite*—Two wineglassfuls of 20 per cent alcohol (the concentration in the usual appetizer or dessert wine) have been found to relieve prolonged gastric tension. Two or three ounces of dry table wine can markedly increase the olfactory acuity and the appetite in anorexia, and stimulate caloric intake.

*The Buffer Action of Wine in Digestion*—The effect of wine on free and total gastric acidity is slower and more prolonged than that of plain alcohol. Because of the buffering action of its phosphates, organic acids and tannins, wine induces a less violent but more sustained increase in gastric secretion and gastric motility.

*Wine Stimulates the Flow of Pepsin*—Ingestion of moderate amounts of wine, notably white table wine, has been found to increase appreciably not only the volume but the proteolytic power of gastric juice.

*Wine in the Diet of Oldsters and Convalescents*—There are sound, physiological reasons, therefore, why the generally lax and achlorhydric stomach of older people and convalescents reacts favorably to the mild, secretory stimulation of wine taken at mealtimes. And wine offers other valuable vasodilating, soothing, relaxing effects . . . a little Port or sherry wine at bedtime is a valuable aid to normal sleep, and may obviate the need for sedative medication.

*Wine to Brighten the Monotonous Diet*—In the dull and often unappealing dietary regimen of many patients, a glass of wine can frequently provide a touch of interest and "elegance"—a psychological boost of inestimable value.

*The Fine Wines of California*—Wines of outstanding quality are coming from California nowadays. Somewhere in the rich soils of the State, each grape variety finds its ideal setting and comes to perfect ripeness each year. Just as essential, modern scientific methods result in wines of controlled quality standards, true to type—and what is highly important from your patient's standpoint—moderate in price. Wine Advisory Board, San Francisco 3, California.

*Research information on wine is available upon request.

# NOT ARTHRITIS BUT ARTHRALGIA...

If the patient complaining of aching joints is a woman between 37 and 54 years of age, it is highly possible that she is suffering from arthralgia rather than arthritis.[1] It has been estimated that arthralgia occurs in about 40 per cent of women with estrogen deficiency, and is exceeded in frequency only by symptoms of emotional or vasomotor origin.[2] In fact, arthralgia may be as indicative of declining ovarian function as the classic menopausal hot flushes.

Arthralgia, however, is just one of a vast number of distressing but ill-defined symptoms that may be precipitated by the loss of estrogen as a "metabolic regulator." Other good examples are insomnia, headache, easy fatigability, and tachypnea.

Because these symptoms sometimes occur years before or even long after cessation of menstruation, they are not always readily associated with estrogen deficiency, and the tendency may be to treat them with medications other than estrogen. Obviously, sedatives and other palliatives cannot be expected to produce a satisfactory response if an estrogen deficiency exists. Only estrogen replacement therapy will correct the basic cause of the disorder.

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1. Greenblatt, R. B., and Kupperman, H. S.: M. Clin. North America 30:576 (May) 1946. 2. McGavack, T. H., in Goldzieher, M. A., and Goldzieher, J. W.: Endocrine Treatment in General Practice, New York, Springer Publishing Company, Inc., 1953, p. 225.

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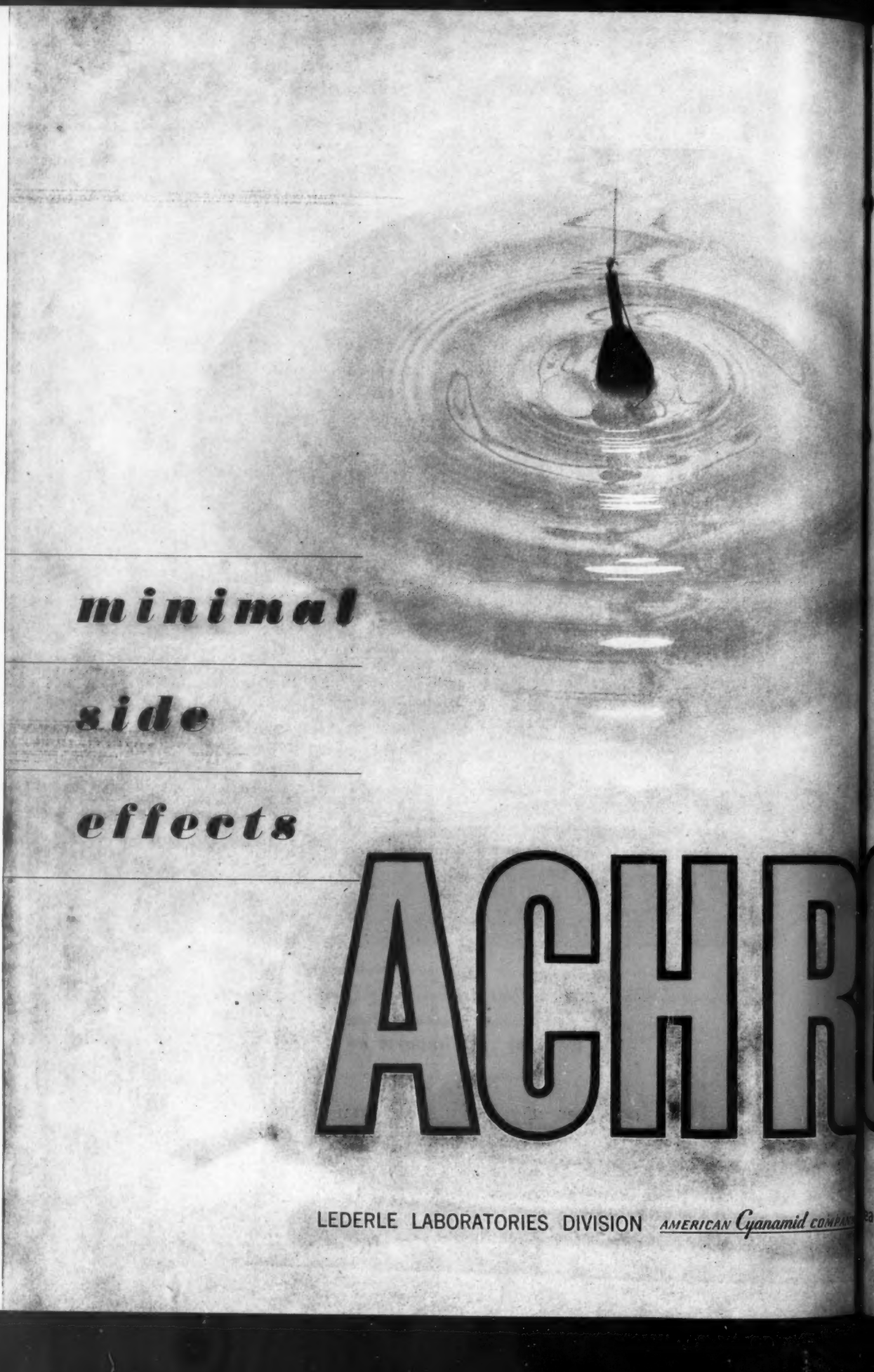
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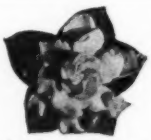

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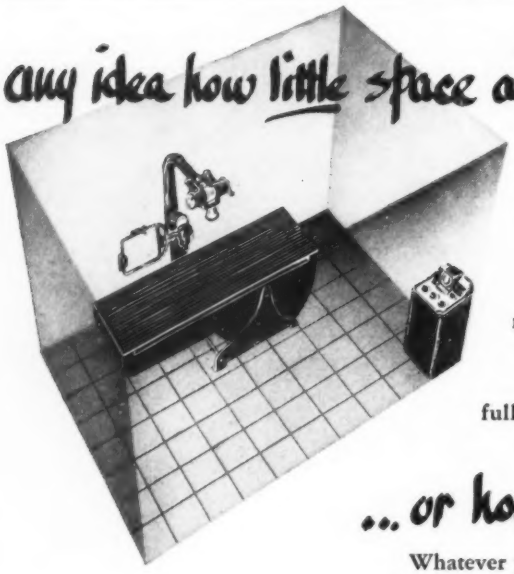

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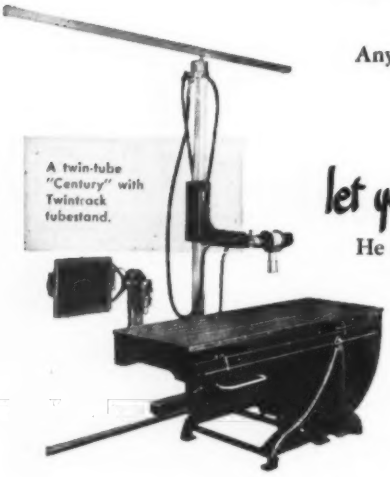

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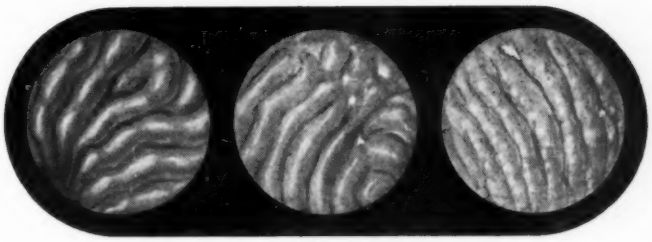

*Rotational gastroscopic views showing coating effect 1½ hours after administration of Amphojel.*[2]

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*References:* 1. Hollander, F.: Arch. Int. Med. *93*:107 (Jan.) 1954
2. Deutsch, E.: Scientific Exhibit, Gastroscopy, Interim Session A.M.A., St. Louis, December, 1953

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**See editorial in this issue**

*Louisiana State Department of Health*

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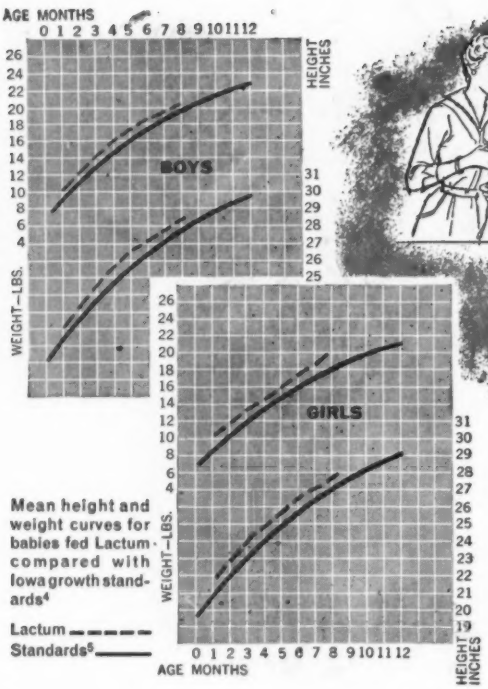
State Health Officer



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(1) Jeans, P. C.: In A.M.A. Handbook of Nutrition, Ed. 2, Philadelphia, Blakiston, 1951, p. 275. (2) Albanese, A. A.: Pediat. 8: 455, 1951. (3) Holt, L. E., Jr., and McIntosh, R.: In Holt Pediatrics, Ed. 12, New York, Appleton-Century-Crofts, Inc., 1953, pp. 175-178. (4) Frost, I. H., and Jackson, R. L.: J. Pediat. 39: 585, 1951. (5) Jackson, R. L., and Kelly, H. G.: J. Pediat. 27: 215, 1945.

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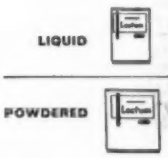


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